Better Homes and Gardens®

WOOD

THE MAGAZINE FOR HOME WOODWORKERS

$3.50

APRIL 1987•ISSUE NO. 16
Display Until April 16

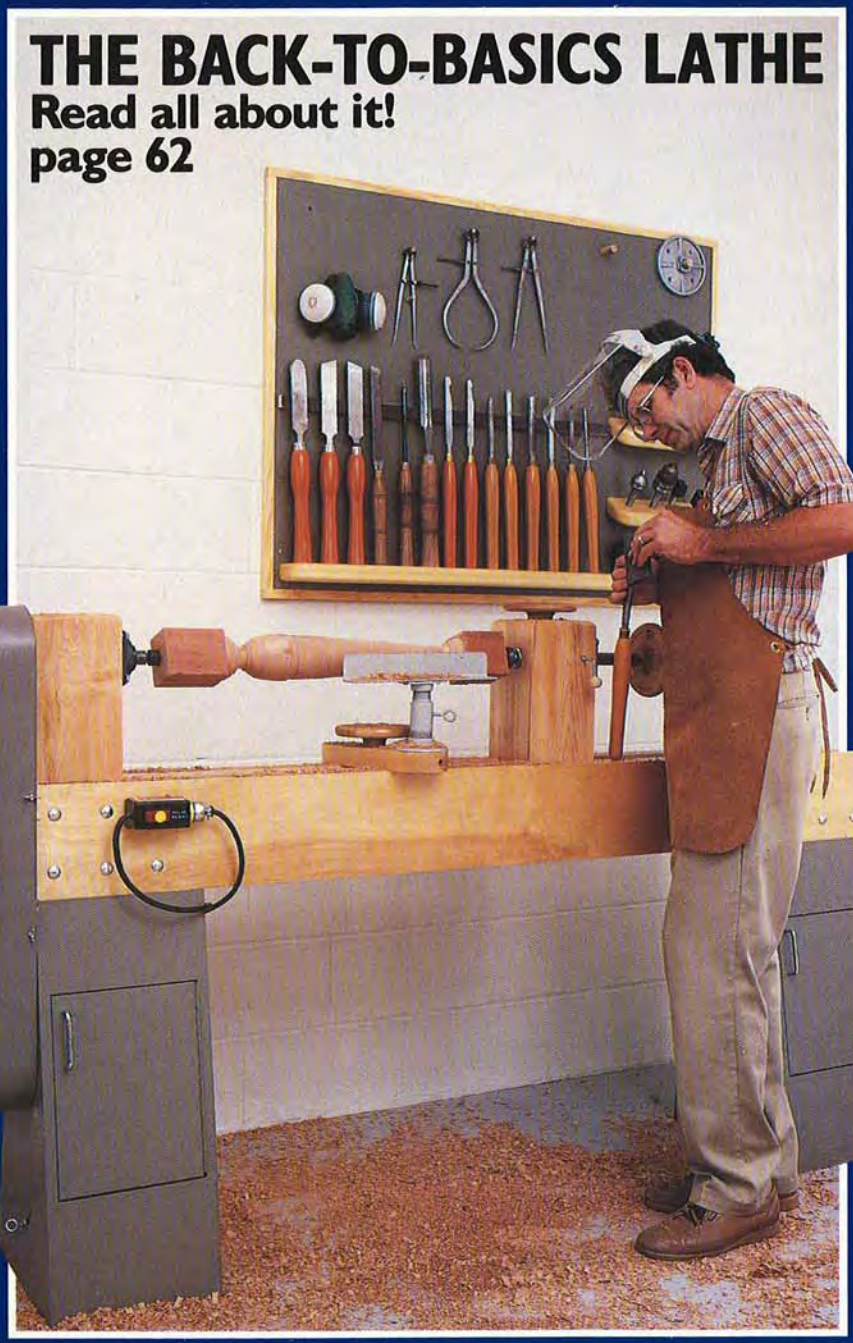
5 SENSIBLE SHOP ORGANIZERS
complete with plans

ANILINE DYES
Mix-it-yourself color for more natural-looking wood grain detail

NEW PORTABLE DUST COLLECTORS
See our buymanship report beginning on page 54

CLASSIC FURNITURE
A woodworker's guide to early America's fine furniture styles

PLUS THESE PROJECTS!
Cherry nightstand
Train-tunnel bookends
Rubber-band dragster



THE BACK-TO-BASICS LATHE
Read all about it!
page 62

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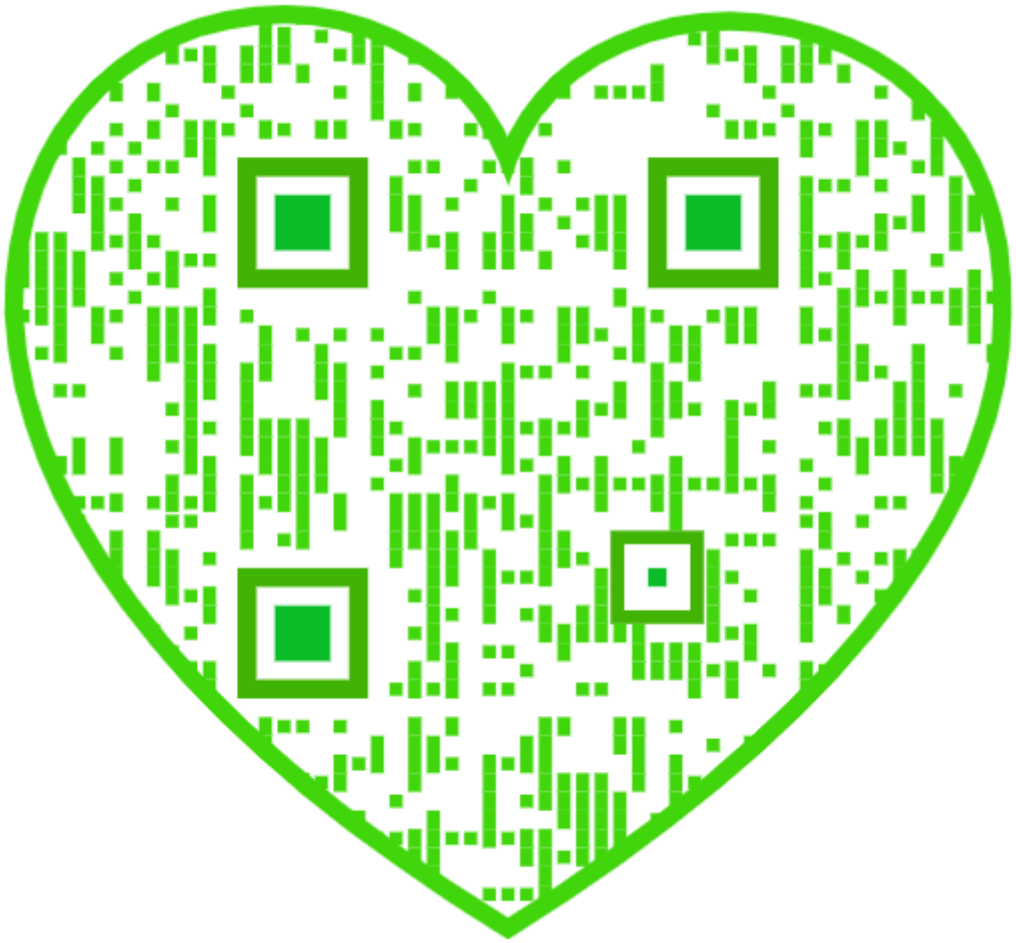
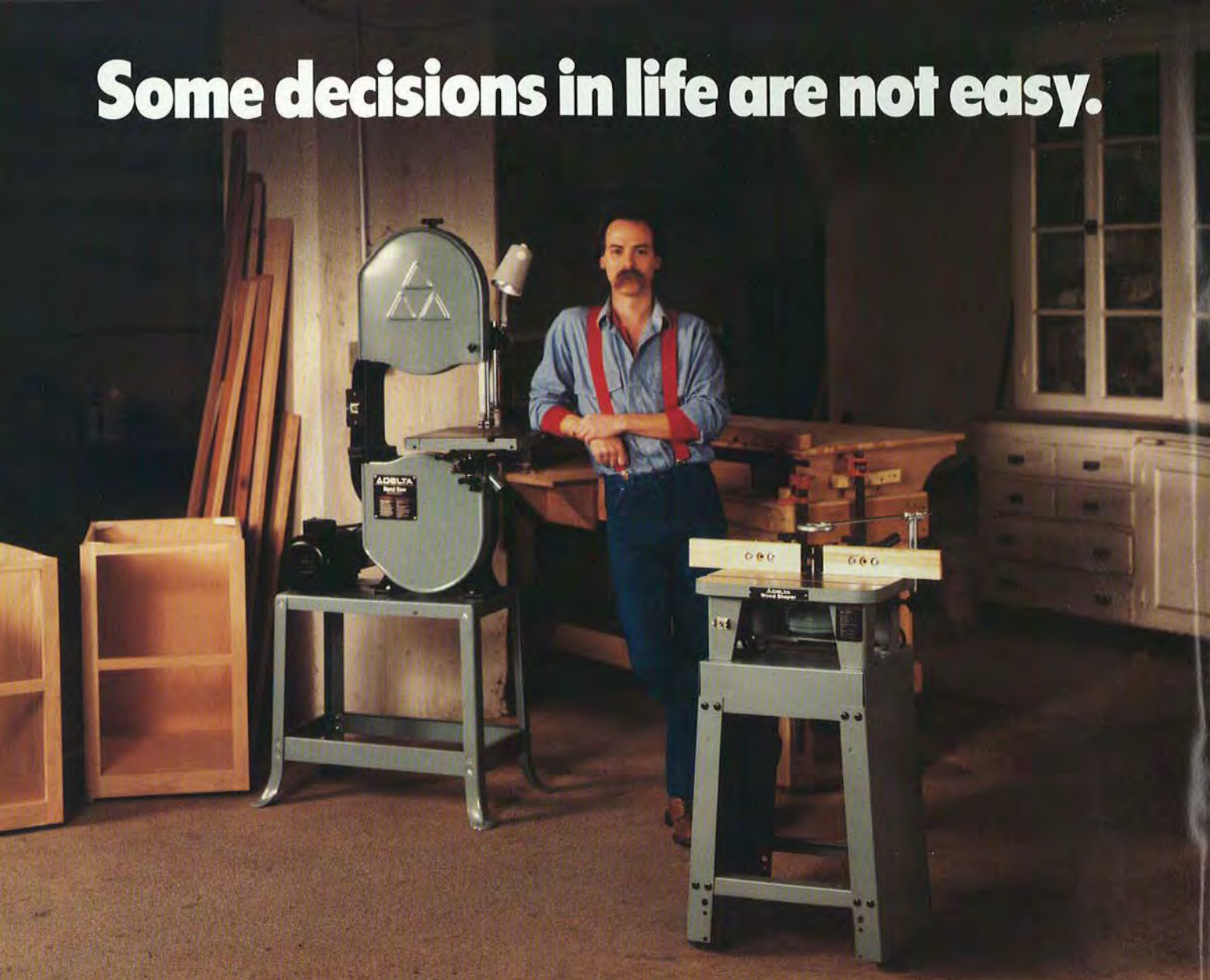


Some decisions in life are not easy.



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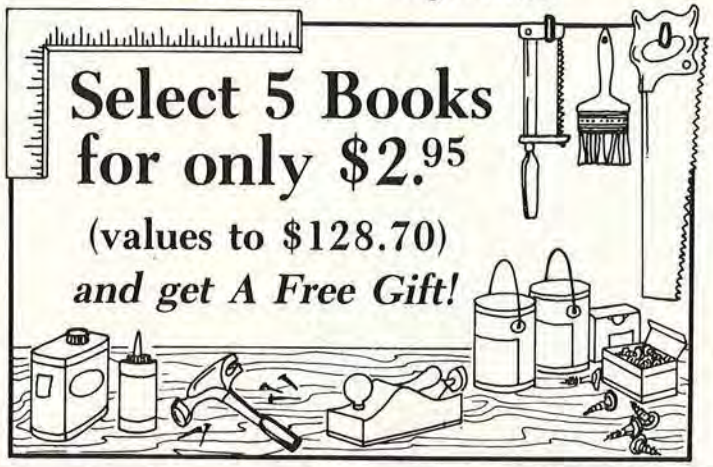

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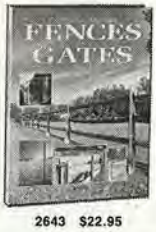

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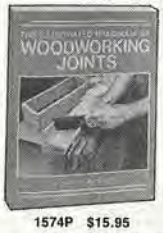

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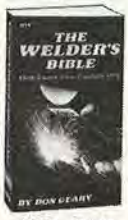

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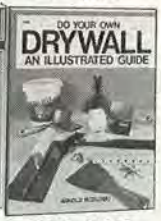

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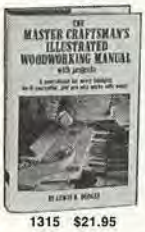
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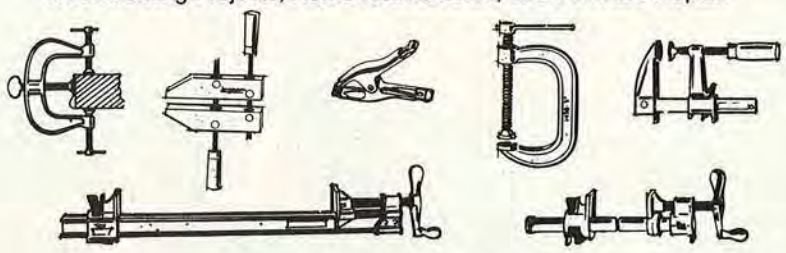

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WOOD
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April 1987 • Vol. 4, No. 2 • Issue No. 16

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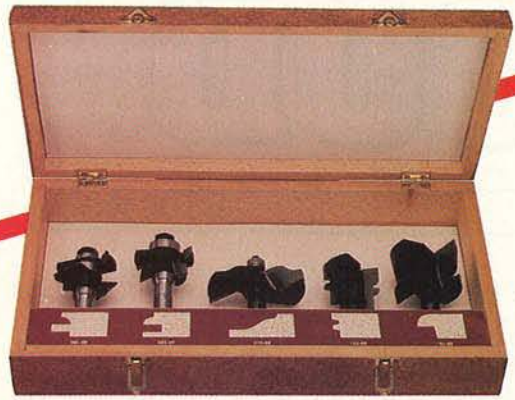


ROUTING

Freud's new 5 piece router bit door system allows you to produce raised panel cabinet doors with your ½" chuck router. Each bit is made with the finest carbide available and sharpened with a 600 grit diamond wheel.

The bit profiles are: rail and stile, raised panel, door lip, glue joint. The bits come in a wooden, box jointed case for ease of storage.

As a set, the 94-100 list for **$248.00** ..... Sale Price **$199.00**

SHAPING

Freud's new 5 piece cabinet set for the ¾" - ½" shaper comes with rail and stile, raised panel, door lip and glue joint cutters. A box jointed, wooden case is included for ease of storage and prevention of damage.

The cutter profiles are: rail and stile, raised panel, door lip, glue joint.

The cutters are made with the highest of manufacturing standards and materials. If purchased individually, they would cost $510.00.

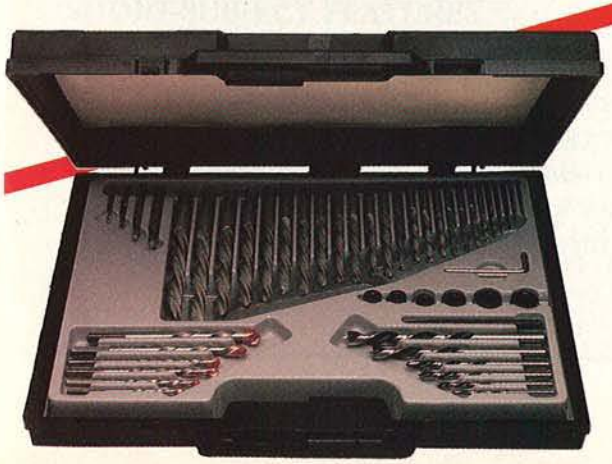
As a set, the EC-900 list for **$449.00** ..... Sale Price **$349.00**

BORING

Freud's new 16 piece Forstner bit set comes in a box jointed, wooden storage case. These bits, guided by their rim, will create a clean flat bottom hole in wood. A special heat treated steel is used in their production to assure long lasting edges.

The 16 bits range in size from ¼" to 2⅛" in ⅛" increments. These bits will fit any stationary or portable drill using a ⅜" or larger chuck.

The FB-100 Forstner bit set list for **$249.00** ..... Sale Price **$199.00**



DRILLING

Freud's new 50 piece drill bit set comes with a heavy duty carrying case for ease of storage and protection. This set consists of: A) 25 high speed steel bits (1/16 - ½ in 1/16 increments) B) 4 high speed steel bits for use in sheet metal (¼, 3/16, ⅛, 3/32) C) 6 chrome vanadium steel brad point bits for use in wood (⅛, 5/32, 3/16, ¼, 5/16, ⅜) D) 6 carbide tipped masonry bits with hex shanks (5/32, 3/16, 7/32, ¼, 5/16, ⅜ E) 1 center punch, 2 Allen keys and 6 depth stops to set bits at pre-determined depths.

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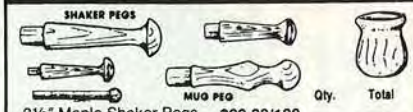
WOODWORKS



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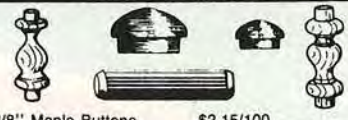

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WOOD

The wood grain in cover logotype this issue is poplar.

APRIL 1987 **ISSUE NO. 16**

WOOD PROFILE

ELM: THE HARD-AS-NAILS HARDWOOD WITH BEAUTY A BURL DEEP 37

A beautifully grained, tough, and durable wood, but few craftsmen know its woodworking properties.

CRAFTSMAN CLOSE-UP

BLOWING IN THE WIND 38

What's a whirligig? Find out as craftsman Andy Lunde shares his secrets gleaned over a decade of whirligig tinkering. He's also designed one for you to make.

FIND IT FAST: 5 SUPER SHOP ORGANIZERS 42

We'll bet you don't like wasting time hunting around for tools anymore than we do. Not long ago we took the bull by the horns and designed these easy-to-build tool organizers. We've put all of them to work in our shop, and so can you.

ANILINE DYES: MIX-IT-YOURSELF MAGIC FOR NATURAL LOOKING WOOD TONES 48

Here's wood coloring with a difference. These easy-to-use stains penetrate the wood while letting every wood grain detail show off. You'll find using these dyes easy on the budget, too.

WOODWORKERS' GUIDE TO CLASSIC FURNITURE 50

William and Mary, Queen Anne, Chippendale, Federal — furniture crafted during Colonial America's Golden Age. Classical and unique — here's how to identify them.

TOOL BUYMANSHIP

PORTABLE DUST COLLECTORS 54

Shop cleanup getting you down? Attach one of these new dustbusters to your hard-working power tools and let it handle all the waste. We tried out a dozen of these roll-around units and report what we found out.

HOMEMADE TOOLS

WOOD'S BACK-TO-BASIC SHOP LATHE 62

Considering a lathe? Why not make one. We show you how step-by-step. And, we've included a mail order source listing for the hardware.

BE A BETTER WOODWORKER TAKE A HOBBY VACATION 70

Sharpen your woodworking knowledge and skills while vacationing. Here's a detailed rundown on courses being offered at these increasingly popular get-away-from-it-all classes.

CLASSIC CHERRY NIGHTSTAND 74

You're not going to believe how easily the louver doors go together. Our technique makes cutting the louvers a breeze, without jigs.

TRAIN-TUNNEL BOOKENDS 80

Books never had it so good! This clever, finely detailed pair of bookends will earn you many admiring ohs and ahs whether you display them on your desk or mantel.

RUBBER BAND-POWERED DRAGSTER 84

It will be non-stop racing when your favorite youngster winds up this snappy little dragster. Make several so friends can get in on the action, too!

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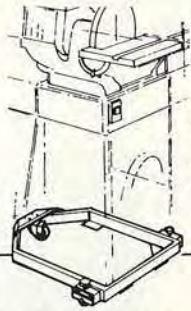

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What's the one thing all woodworkers need more of? We think it's projects. That's why we put as many of them into each issue as will fit. But before any project makes it into *WOOD,* it must pass under the watchful eyes of Jim Downing, our Design Editor (that's him above).

The other day Jim came into the office, sat down, and said, "I've got a great idea! Rather than always sending us around the country to crafts fairs, woodworking shows, and shopping mall exhibitions to locate project ideas, why don't you set up a scouting network — maybe a dozen people around the country — and have them submit project ideas for consideration? That sure would make my job a lot easier. And I'll bet we'd be able to come up with even better projects that way."

Not one to turn my back on a brilliant suggestion, I said, "Jim, you're a genius! Let's try it. But wait a second. What should we tell them we're looking for? How are we going to select the right kind of people for the job? And how much should we pay them?"

Not one to leave me with a problem and no solutions, Jim said, "What we need more of are well-designed small-scale projects that a person can build in a weekend or less. You know, gift ideas, bazaar items, and the like. Let's ask those interested in helping locate these types of projects to write and tell us why they think they're qualified to be project scouts. And what do you say we offer them a $100 scouting fee for every idea they submit that we decide to publish? That ought to generate some excitement."

"And while we're at it," Jim said, "why don't we offer $100 to any of our readers who tip us off to the whereabouts of any original project we decide to publish? It could be something they've built or a project one of their friends has come up with."

"Sounds terrific to me," I said.

How does it sound to you, readers? If you're interested in picking up a quick $100 or becoming a *WOOD* Magazine project scout, write a letter to GREAT PROJECT IDEAS, c/o *WOOD* Magazine, 1716 Locust Street, Des Moines, IA 50309, Attention: James R. Downing. Please send snapshots of the projects and the names and phone numbers of the builders.

Print this article

Larry Clayton

TALKING BACK

We welcome comments, criticism, suggestions ...even an occasional compliment. The volume of mail we receive makes it impossible to answer every letter, but we promise to do our level best. Send your correspondence to: Letters Editor, Better Homes and Gardens® WOOD Magazine, Locust at 17th, Des Moines, IA 50336.

A "BOY" BODARK?

I was very interested in the item "Saga of Osage Orange" in October's WOOD Magazine (pg. 29). I have a beautiful bodark tree next to my shop that measures over 27" in diameter at the base, about 40' tall, and spreads over an area about 80' wide.

This one, however, bears no fruit and has no thorns. Someone said it could be a male tree. In any case, I know it's a bodark and have turned some nice colored pieces from it. In fact, I could send you a chunk that's been air-drying two years. You could turn an unusual vase or some candlesticks.

— William (Bill) Martin, Ft. Smith, Ark.

Thanks, Bill, for the offer of bodark, but we occasionally come across some right here in Iowa. And by the way, you do have a "boy" bodark, a not-too-unusual occurrence among trees according to our wood expert, Paul McClure. He says, though, that your tree's lack of thorns makes it unique.

Good specimens of bodark can be found along fence rows in many rural areas. However, if you want a piece for turning or woodworking, better take it from parts of the tree at least five feet above ground. If the tree stands in a fence line, there's a good chance it will have wire embedded in it.

LOVE THOSE STACK LAMINATED BOWLS

Bingo! What a beautiful issue (December '86) of WOOD Magazine. I particularly enjoyed the faceplate-turning article, and the sources of burls was excellent.

Now, could you, would you, please have an article on how one can design the interesting configurations for bowls and dishes shown in the tung oil finishing story? Bill Lovelace sure does beautiful work and I, like many, would like to get some idea of how he builds his designs.

Incidentally, I have been using tung oil for finishing my furniture pieces for the last 20 years — there's nothing like it.

— Edward A. Otocka, Kilmarnock, Vir.

Ed, we couldn't agree with you more — Bill Lovelace's stack laminated bowls are beauties. And to answer your question, we do plan to have an article on stack laminate designing in the near future.

Print this article

Continued on page 8

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TALKING BACK

Continued from page 7

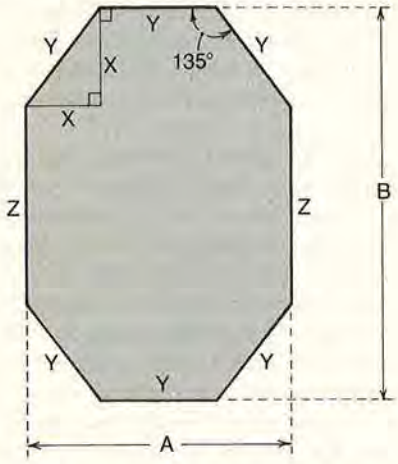
MATHEMATICS WORKING IN THE SHOP

I recently made an octagon mirror frame out of walnut and was faced with a problem. The frame had to sit in a rectangular opening 17½"x23", so how long should I cut each board?

To determine the length of the pieces, I did as you described in the Shop Geometry article (Dec. 1896 pg. 54-55).

On paper I laid out the octagon inside a rectangle 17½"x23", then measured the pieces for size. This was time consuming and tricky. I decided that there must be an easier way, so I dug into my high school algebra and came up with this solution. It's fast, simple, and accurate.

To figure the length of the sides of the octagon when you only know the overall size:



1. At least six sides must be equal. Call these sides Y. Call the other two sides, Z.
2. Determine the outside dimensions desired. Call these A and B (see drawing).
3. Let X be the two legs of a right triangle which has Y as the hypotenuse.
4. Now, solve the following equations:
   A: X = A ÷ 3.4142135
   B: Y = A − 2X
   C: Z = B − 2X
5. The six equal sides equal Y, the other two equal Z.

EXAMPLE

Let A = 17.5"
B = 23"
X = 17.5 ÷ 3.4142135 = 5.125
Y = 17.5 − 10.25 = 7.25"
Z = 23 − 10.25 = 12.75"
Solution: cut 6 pieces 7¼", 2 pieces 12¾"

— Charles Van Bibber, Key West, Fla.

You've really done your homework well, Charles. And, we're happy to pass along your solution for other WOOD readers to use.

Continued on page 12

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TALKING BACK

Continued from page 8

NOW HERE'S AN AMBITIOUS WOODWORKER

Congratulations! The October issue of WOOD is the best yet. The only problem is, you guys are busting my budget wide open with so many projects that I have to build. Two of the cedar-lined chests for a pair of graduating granddaughters, and two of the jewelry cases for two daughters are already spoken for. Now Mother is hollering that she wants one, too, so guess my winter projects are about spoken for.

And, where did you get that beautiful marking gauge shown in the mortise and tenon joinery story? I must have one of them.

Richard M. Berrian, Dateland, Az.

Sounds like your winter will be very busy, Richard, filling all those orders. They are great projects and you can bet they'll be appreciated. The marking gauge you asked about appeared as a project in the very first issue of WOOD Magazine (September, 1984, pages 62-63). We'll see you get a copy of the directions. And, thanks for the compliment.

A GOOD Rx FOR PATTERNS

I have a suggestion for transferring carving patterns to wood (WOOD, Page 18, October, 1986) — Cardboard can be used, alright, but our carving club uses old X-ray film that we get from precious metal reclaimers after all the silver has been removed. Just contact a local X-ray lab and find out where they sell their used X-ray film and get it from them. To use, simply trace the pattern on the film sheet with a felt tip pen, then cut it out with a scissors. You can also write notes or directions on the film for future reference.

John S. Mincy, Fresno, Calif.

Sounds like good medicine to us, John. Films like these normally are made of an acetate-like material. They are usually transparent enough so you can lay a sheet over the original pattern and trace it directly onto the film — much easier than using carbon paper.

THANKS FOR THE WOOD SHOP TOUR

Just a note to thank you for the tour of your shop. It was interesting. A visit to your shop to see the tools and projects would be inspiring to any woodworker.

Chester D. Beintema, West Covina, Calif.

Your letter, Chester, serves as a reminder for all readers that our invitation to visit WOOD offices still holds. All are welcome to stop in during normal office hours, Monday through Friday, to visit with the editors and designers, and to see our shop and the projects on display. We're located at 1912 Grand Avenue in Des Moines, Iowa.

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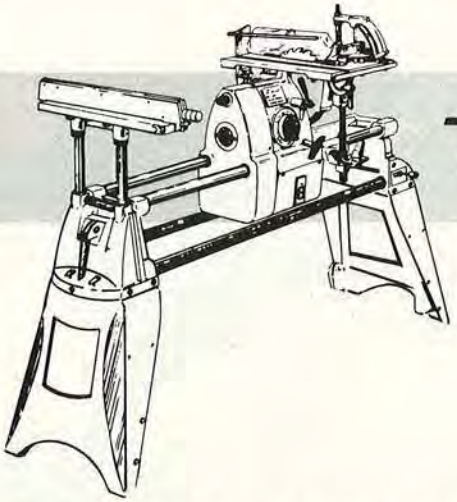

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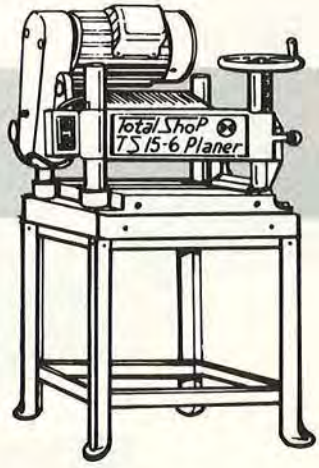

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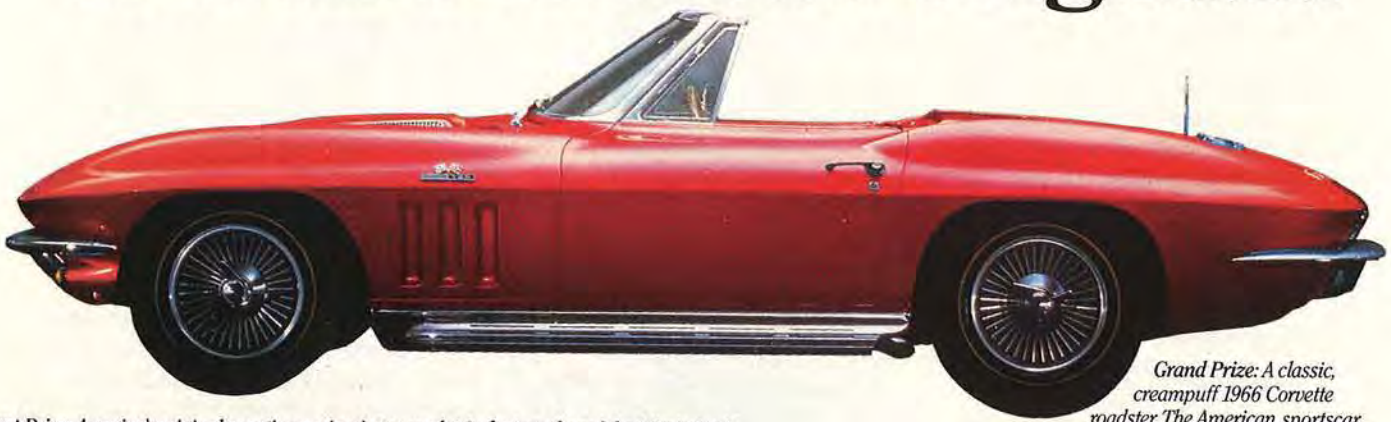
These are but a few of the stories behind America's original CooperTools brands. The men who built these original hand tools didn't try to turn out the cheapest products, but rather the best.

After all these years, that's one thing we're not about to change.

Because that's what makes a CooperTools brand an original.

To celebrate our continuing

Your chance to win one of these famous American Originals.



Grand Prize: A classic, creampuff 1966 Corvette roadster. The American sportscar.

First Prize: America's original vacation cruise. A one-week trip for two aboard the Mississippi Queen Steamboat, including round-trip airfare and $1,000 spending money.

Ten Second Prizes: $1,000 worth of selected CooperTools hand tools.

50 Third Prizes: A working oak and brass reproduction of the country telephones of the early 1900's.

250 Fourth Prizes: Your own original Louisville slugger, with your name branded right into the wood.

250 Fifth Prizes: Nothing's so sweet as winning, especially when it's this 5 lb. Hershey bar personalized with your name.

commitment to quality, we invite you to enter the CooperTools *American Originals Sweepstakes.*

You could win one of over 560 prizes, including your own workshop full of CooperTools hand tools, or a classic 1966 Corvette roadster—America's original sportscar.

Here's how to enter. No purchase necessary. Visit your participating CooperTools retailer for full details and entry forms or send a self-addressed, stamped #10 envelope to: CooperTools American Originals Request, P.O. Box 4878, Blair, NE 68009. Limit one request per envelope. Requests must be received by 8/10/87. Residents of VT and WA only need not affix postage to their self-addressed envelopes. Sweepstakes open to U.S. residents, 21 years of age or older at time of entry. Void in AK and HI and where prohibited by law. Sweepstakes ends 8/31/87.

CooperTools

The difference between work and workmanship.

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In woodworking, as in life, no one knows it all. But through experience, we all discover — or stumble onto — better, safer, faster, or easier ways to do things. When we devise interesting tips or techniques, we'll share them with you in this column. And when you send us your favorites, we'll pay you $25 for each submission we publish. No shop tips can be returned. Mail your tips to:

Shop Tips
Better Homes and Gardens®
***WOOD* Magazine**
Locust at 17th
Des Moines, IA 50336

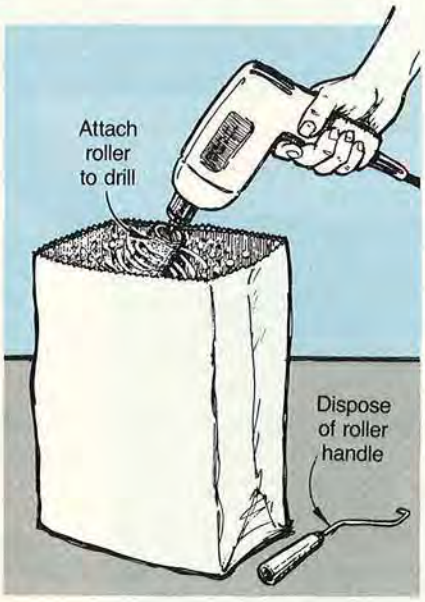
SPIN-DRY YOUR ROLLERS

We like to use paint rollers for applying white glue over large areas, such as tabletop laminations. Can the gluey roller be washed and reused?

You bet — immediately after using it, wash it thoroughly and take this additional step:

TIP: Cut off the "business end" of an inexpensive roller frame, attach the wet roller, chuck the cutoff frame in your electric drill, and "spin-dry" the roller inside a paper bag. This effectively removes any residue left after washing, and leaves the roller nap silky smooth when dry. This trick also works when washing out latex finishes.

— From the WOOD shop.

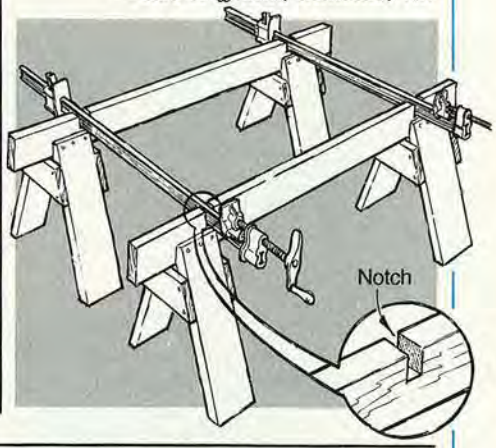


HORSING AROUND WITH BAR CLAMPS

Many woodworkers don't have a large enough clamping table for doors and other wide objects. And, bar clamps have a tendency to flop to one side when laid on a flat surface.

TIP: Summon a couple of sawhorses to the rescue. Notch the horses and insert your bar clamps or pipe clamps, as shown in the drawing *below.* For flat sawhorses and workbenches, notch two 2x4s in a similar fashion and tack them to the work surface.

— Rob Huffman, Danville, Va.



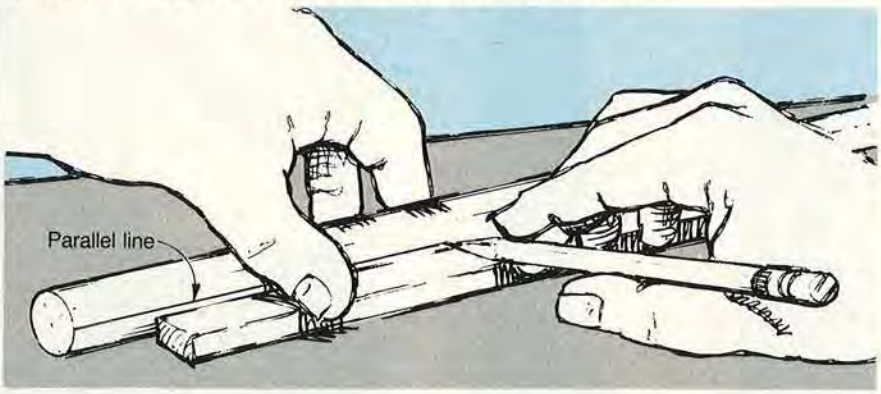
PIGGYBACK BRUSH HOLDER

You're brushing paint or varnish on your project, when the phone or doorbell rings. Where's a clean place to put the brush?

TIP: Use masking tape or duct tape to attach a small plastic container to the outside of the paint or varnish can. Narrow, oval, or rectangular containers work best.

— Jeff Mathers, Grimes, Iowa.

DRAWING PARALLEL LINES ON A CYLINDER



Sometimes you need to pencil straight, parallel lines along the axis of round stock, such as when you align spindle holes on a dowel rail for a chair back. This can be frustrating without some kind of a jig.

TIP: On a flat, smooth work surface, snug together the round stock to be marked and a thin wood strip. Draw the first line on the round stock along the edge where the two pieces meet. (You may need a helper to hold the pieces together while you mark the stock.) Rotate the round stock to draw other parallel lines at the desired spacing, as shown in the drawing *above.*

— From the WOOD shop.

Continued on page 22

RYOBI TOOLS

		List	Sale
S500A	3x5½ Finish Sander	70	41
SU6200	Finishing Sand. ½ Sheet	142	88
B7075	3x21" dustless Belt Sand.	179	116
B7100	3x24" dustless belt Sand.	208	140
B7200A	4x24" dustless Belt Sand.	269	165
D100VR	3/8" VSR 0-1200 rpm drill.	91	49
W640	7¼" 13 amp circular saw	158	99
W740	8¼" 13 amp circular saw	171	109
JS60	Jig Saw-Single Speed	172	99
JSE60	Jig Saw-electronic v/speed	198	123
R150	1 H.P. Plunge Router	138	86
R330	2 H.P. Router	220	138
R500	3 H.P. Router	265	163
E3800	Drywall screwdriver 0-4000	126	79
L120U	3⅛ Planer	142	89
BD1020R	3/8" 2-spd Cordless Drill w/free holster-Xtra special buy	148	95
TS251U	10" Mitre Box	300	169
SG1150C	4½" H.D. Mini-Grinder	99	59

YOUR ATTENTION PLEASE!

All Above RYOBI TOOL Prices

Take Additional 10% OFF Sale Prices

MILWAUKEE TOOLS

		List	Sale
0224-1	3/8 drill 4.5A magnum	173	109
0234-1	½ drill 4.5A magnum	173	112
0244-1	½ drill 4.5A magnum	173	115
0222-1	3/8 drill 3.3A 0-100 rpm	159	99
0228-1	3/8 drill 3.3A-0-1000 rpm	139	92
0375-1	3/8 close quarter drill — NEW — 3.5 amp	191	118
0210-1	3/8 cordless drill — NEW — 2 speed	189	95
6539-1	cordless screwdriver — NEW — 190 RPM	99	59
1007-1	½" drill 4.5A D-Hdle	217	145
1107-1	½" drill 4.5A D-Hdle	222	145
3300-1	magnum rt angle drive kit	271	170
3102-1	Plmbrs rt angle drill kit	287	180
1676-1	HD Hole Hawg w/cse 2 sp	363	235
5395	3/8 sgle sp hammer drill kt	203	150
5397	3/8 var sp hammer drill kit	208	155
5371-1	HD mag. hammer drill ½"	313	207
5373	HD mag. ham. drill 3/8"	262	175
6511	2 speed Sawzall w/case	197	122
6226	port band saw 2 sp w/case	416	280
6234	TSC band saw port w/case	416	280
6405	8¼" circ. saw 13 amp	191	127
6460	10¼" " 15 amp w/case	380	245
6165	12" Chop saw 15 amp 4200 R.P.M.	311	189
6255	v/sp Jig Saw 3.8 amp	217	140
6245	sgle sp Jig Saw 3.8 amp	191	125
6012	⅓ sheet HD Orb. sander	173	110
6014	½ sheet HD orb. sander	184	112
5660	1½ HP router 10 amp	289	175
5680	2 HP router 12 amp	342	220

DRYWALL SHOOTERS

6753-1	3.5 amp 0-4000 rpm new	125	79
6747-1	4.5 amp 2500 rpm	157	100
6750-1	4.5 amp 0-4000 rpm	141	90

NEW FROM RYOBI

MODEL AP-10 — 10" Surface Planer

WEIGHS ONLY 58 LBS.

LIST 659.00 — SALE 375.00

MILWAUKEE Super Specials!

*** * BRAND NEW * ***

Model 0212-1 Cordless Variable Speed 3/8" Drill

LIST. . .209.00 SALE. . .125.00

Model 6145 — 4 1/2" Sander-Grinder

LIST. . .149.00 SPECIAL SALE. . .85.00

Go Cordless with MILWAUKEE

#6305 — 6¼" Cordless Circular Saw

12 volt — 1 Hour Charge

Cuts (80) 2x4's (Pine)

List Price 229.00 ★ SALE PRICE 119.00

FREUD SAW BLADES

Univ. Bore — Professional Series

CARBIDE TIPPED SAWBLADES

Item No.	Description	Diam.	Teeth	List	Sale
PS203	Gen'l Purp.	7¼"	24	27.24	17.50
PS303	Fine cutting	7¼"	40	32.97	20.50

⅝" Bore — Industrial Grade

CARBIDE TIPPED SAWBLADES

Item No.	Description	Diam.	Teeth	List	Sale
LU72M010	Gen-l Purp.	10"	40	68.58	34
LU81M010	Gen-l Purp.	10"	40	69.30	35
LU73M010	Cut-Off	10"	60	79.65	36
LU82M010	Cut-Off	10"	60	86.40	44
LU84M010	Combination	10"	40	70.99	36
LU84M011	Combination	10"	50	74.51	37
LU85M010	Super Cut-Off	10"	80	110.88	62
LM72M010	Ripping	10"	24	64.85	34
DS 306	5" Dado			139.00	92
DS 308	6" Dado			170.00	105
TR 100	3 blades & Dado set			399.00	255

MAKITA CORDLESS FESTIVAL OF VALUES

Model		List	Sale
4300DW	Jig Saw	158	99
5081DW	3⅜" Saw Kit	174	95
5600DW	6¼" Circular Saw	224	125
9035DW	Finishing Sander	128	73
6010DWK	3/8" Cordless Drill Kit	152	88
6010SDW	3/8" Cordless Drill	84	45
8400DW	3/8" Hammer Drill	188	105
DA3000DW	3/8" Angle Drill	176	98
6010DL	3/8" Drill w/Flashlight	162	89
6012HDW	3/8" 2 spd Driver Drill w/Bat & Metal Case	178	98
DK1002	3/8" Drill w/Flursnt Lt	164	90
6710DW	Cordless Screwdrvr Kit	148	84

LEIGH DOVETAIL JIGS

Model	List	Sale
TD514	149	125
TD514L	219	195
D1258-12	299	245
D1258-24	359	275

MAKITA BRAND NEW X-TRA SPECIAL

Model	List	Sale
5007NBA - 7¼"Saw w/Elec. Brake	186	115
5008NBA - 8¼" Saw w/Elec. Brake	212	130

MAKITA TOOLS

		List	Sale
BO4510	Sander	86	43
9900B	3"x 21" belt sander	218	119
9924B	3"x 24" belt sander	208	130
9924DB	3"x 24" b/sand. w/bag	234	130
9035	⅓ sheet finish sander	88	48
9045B	½ sheet finish sander	184	90
9045N	¼ sht fin. sand. w/bag	184	105
4200N	4⅜ circ. saw 7.5 amp	168	93
5008NB	8¼ circ. saw 13 amp	198	105
5201NA	10¼ circ. saw 12 amp	398	215
4300BV	v/sp jig saw 3.5 amp	218	120
4301BV	orb v/sp jig saw 3.5 amp	230	125
JR3000WL	2 sp recip saw w/cse	188	120
JR3000V	vs recip saw w/case	198	120

*** * * MAKITA TOOLS * * ***

SPECIAL PROMOTION

LS1000	New 10" Mitre Box	368	198
792210-7A	Carbide Bld for above	49	31
9820-2	Blade Sharpener	268	159
741074-9	60 (coarse) Grdg Whl	33	23
741070-7	1000 (med) Grdg Whl	31	22
741071-5	6000 (fine) Grdg Whl	43	30
1900BW	3¼" planer w/case	178	92
1100HD	3¼" planer w/case	312	160
3608BK	¾ hp router w/case	132	85
3601B	1⅜ hp router	198	115
3700B	½ hp trimmer 28,000 rpm	148	82
BO4530	6" Round Sander	90	48
DA3000	3/8" angle drill	188	105
DP4700	½ v/sp w/rev" 4.8 amp	172	92
HP1030W	3/8 v.s.r. hammer drill w/case	158	98
6300LR	½" angle drill w/rev	268	152
8419BB-2W	½" s sp. hammer drill w/case	268	150
GV5000	Disc Sander	98	53
6800DB	2500 rpm 3.5 amp	134	79
6800DBV	0-2500 rpm 3.5 amp	144	89
6801DB	4000 rpm 3.5 amp	134	79
6801DBV	0-4000 rpm 3.5	144	89
2030n	12" planer/jointer	2360	1475
2040	15⅝" planer	1930	1195
1805B	6⅛" planer kit w/case	466	265
JV1600	var. speed jig saw	162	89
JV2000	var. speed orb. jig saw	188	100
5005BA	5½" circular saw 8 amp. with brake	176	98
9207SPC	7" var/speed electronic sander/polisher	238	130
9303BH	4½" sander-grinder kit	146	95
4014NV	var/speed blower	138	79

DELTA — BRAND NEW

Model		List	Sale
34-080	10" Miter Box w/rotary table	279	179

○○○ ***Repeat of a Sellout*** ○○○

DELTA — SUPER SPECIAL

40-601	18" Electronic v/sp scroll saw — complete	1117	679

WE NOW HAVE A COMPLETE STOCK OF BOSCH CARBIDE TIPPED SHAPER CUTTERS

ALL SALE PRICES AT 40% OFF LIST.

buying from Seven Corners Hdw. . . . is a good Rule to follow.

Model	STANLEY	List	Sale
33-116	PL-316 3/4" x16' Rule	15.95	7.50
33-320	PL-320 3/4" x 20C Rule	16.95	7.95
33-425	PL-425 1" x 25' Rule	18.95	8.95
33-430	PL-430 1" x 30' Rule	20.95	9.95

1987 TOOL CATALOG AVAILABLE

Call Toll-Free 1-800-328-0457 — In Minnesota Call (612) 224-4859

4 WAYS TO BUY: CHECK — MONEY ORDER — VISA — MASTERCARD

SEVEN CORNERS ACE HDW. Inc.

216 West 7th St. • St. Paul, MN 55102 • Est. 1933

SAW-ATHON by PORTER CABLE

#314	4½" Trim Saw	
List 180		SALE 109
#345-1	6½" Top Hdle	
List 161		SALE 100
#617	7¼" Push Hdle	
List 166		SALE 96
#587	7¼" Speedtronic	
List 199		SALE 125
#315-1	7¼" Top Hdle	
List 166		SALE 96
#368-1	8¼" Top Hdle	
List 175		SALE 110

BELT SANDERS by PORTER CABLE

#363 — 4" x 24" w/o Bag
List - 280 Sale - 185

#362 — 4" x 24" w/Bag
List - 295 Sale - 198

#503 — 3" x 24" w/Bag
List - 510 Sale - 350

DELTA

#34-410 — 10"

CONTRACTORS SAW

w/Stand & 1½ H.P. Motor

SPECIAL PRICE 679.00

FACTORY REBATE 100.00

579.00

FREE DELIVERY TO 48 STATES

TOOLS ON SALE™

AMERICA'S LOWEST PRICED TOOLS

PLUS — FREE FREIGHT

ON EVERY ITEM

SUPER CORDLESS SPECIALS from BLACK & DECKER

Model	DRILL KITS	List	Sale
1930	3/8" rev/hi speed	165	110
1950	3/8" High Torque	165	110
5930	Reversible Hammer	179	120
1970	3/8 rev/hi torque screwdriver	179	120
1980	Rev/adj. clutch Scrudrill	179	120

BRAND NEW! SUPER SPECIALS from MILWAUKEE

0214-1	3/8" c/less drive/drill	189	109
8975	H.D. heat Gun, 11.6A Low 570°F - High 1000°F	81	49
5920	belt sander 3x24 w/o bag	315	199
5925	belt sander 3x24 w/bag	315	215
5930	belt sander 4x24 w/o bag	326	209
5935	belt sander 4x24 w/bag	348	214

PORTER-CABLE = NEW ITEMS +

Model		List	Sale
655	Drywall Driver 0-4000 Rev	115	85
367	3¼" Plane 6.5A	170	115
5009	Mortise & Tenon Jig	50	34
351	3" x21" Belt Sander	189	125
352	3" x21" Belt Sndr w/bag	199	135
9810	Cordless Screwdrvr kit	175	115
320	Abrasibe Plane 3A	129	91

★ ★ ROUTER RIOT ★ ★ by PORTER-CABLE

Model		List	Sale
100	7/7 H.P. 6.5 amp	141	98
630	1 H.P. 6.8 amp	150	100
690	1½ H.P. 8 amp	194	130
691	1½ H.P. D-Hdle 8 amp	218	145
536	1½ H.P. Speedmatic Double Handle	300	190
537	1½ H.P. Speedmatic Double Handle	315	215
520	3 H.P. Production	460	270
518	3 H.P. Micropressor 5-sp	490	345

TRIMMERS BY PORTER-CABLE

309	3.8 amp laminate trimmer	130	90
310	3.8 amp laminate trimmer	190	135
312	offset base laminate trim	205	140
319	tilt-base laminate trim	215	150

★ X-TRA SPECIALS ★

MAKITA TOOLS

		List	Sale
6010DL	C/less Drill w/flashlight-charger & case	174	90
DP3720	3/8 drill Rev. 0-1800 rpm	98	47
6510LVR	3/8 drill Rev. 0-1500 rpm	136	67
6013BR	½" Drill rev. 6 amp	198	100
5402A	16" Circular Saw-12 amp	518	315
2414	14" Cut Off Saw-13 amp	308	169
3612BR	3 HP Plunge Router	318	175
9401	4x24 belt Sander w/bag	268	160

PORTER-CABLE

		List	Sale
696	H.D. Shaper Table	150	105
695	H.D. 1½ hp Router/Shaper	278	190
399	Drywall Cut-Out Unit	100	70
736	V/Speed *Speedtronic* Band Saw	450	330
7564	½" X.H.D. Drill 8 amp	205	145

BOSCH TOOLS

		List	Sale
1581VS	Top Handle Jig Saw	225	126
1582VS	Barrel Grip Jig Saw	126	118
1604	1¾ H.P. Router	199	118
1942	Heat Gun 650°-900°	99	85
1272	3x24" Belt Sander	259	159
1272D	3x24" Belt Sander w/bag	274	169
1273	4x24" Belt Sander	274	169
1273D	4x24 Belt Sander w/bag	289	179

DELTA

		List	Sale
34-010	Motorized Mitre-Box	231	149

★ NEW LOW PRICES ★ PONY CLAMP FIXTURES

Model		List	Sale	Lots of 12
#50	for ¾" Black Pipe	11.23	7.15	79.00
#52	for ½" Black Pipe	9.36	6.10	67.50

JORGENSEN HAND SCREWS

Model	Jaw Length	Open Cap.	List	Sale	Box of 6
#5/0	4"	2"	11.59	7.25	39.15
#4/0	5"	2½"	12.45	8.10	43.75
#3/0	6"	3"	13.36	8.50	45.95
#2/0	7"	3½"	14.36	8.95	48.35
#0	8"	4½"	15.97	9.95	53.75
#1	10"	6"	18.25	11.35	61.25
#2	12"	8½"	20.94	13.60	72.95
#3	14"	10"	26.56	16.75	91.35
#4	16"	12"	34.55	23.75	128.25

JORGENSEN BAR CLAMPS

STYLE 37 — 2½" Throat ¼" x ¾"

Model	Jaw Length	List	Sale	Lots of 6
3#3706	6"	7.88	5.50	29.70
#3712	12"	8.73	5.95	32.13
#3718	18"	9.64	6.95	37.53
#3724	24"	10.54	7.35	39.69
#3730	30"	11.76	8.25	44.55
#3736	36"	12.85	8.95	48.33

Who Has The Saws That Cut It Across The Board?

BLACK & DECKER of course!!!

Model	WORM DRIVE SAWS	List	Sale
3050	6½" 12 amp - 4600 rpm	247	169
3051	7¼" 13 amp - 4300 rpm	232	149
3052	8¼" 13 amp - 4300 rpm	247	169
	SUPER SAWCATS		
3047-09	7¼" w/brake - 12.5 amp	226	149
3048-09	8¼" w/brake - 13 amp	240	155
	BUILDERS SAW CAT		
3030	7¼" 13 amp - 5800 rpm	155	100
3035	8¼" 13 amp - 5800 rpm	175	125
3034	7¼" 13 amp - 5800 rpm	162	115
3033	6½" 13 amp - 5800 rpm	162	115
	JIG SAWS		
3157-10	var/sp orb action d/hdl	174	115
3153-10	var/speed 4.5A 0-3100	158	105
3159-10	2/sp orb action barrel grip	178	120
	CUT SAW KITS		
3103	2 sp 6 amp-2400 strokes	163	100
3105	v/sp 6 amp-2300 strokes	170	110
3107	v/sp orb 6A 0-2300 strokes	183	119
4300	Drill Bit Sharpener	289	205
1321	½" drill 450 rpm 6 amp	175	115
4010	Palm Sander	80	48
4015	½ Sheet Finish Sander	160	105
	DRYWALL GUNS		
2034	v.s.r. 0-4000 rpm	121	79
2037	v.s.r. 0-4000 rpm	139	89

"Door Openers" from MAKITA

9501B	4" Grinder Kit	119	55
2708	8¼" Table Saw	348	199
5007NB	7¼" Circ. Saw	158	94

MILWAUKEE BUY OF THE YEAR

Model 6365 — 7¼" Circular Saw

List $169.00 Sale $99.00

Lots of 3 — $289.00

***Brand New* • PORTER CABLE**

Model 7548 Top Hdle Jig Saw

LIST 199 — SALE 129.95

Model 7648 Barrel Jig Saw

LIST 199 — SALE 129.95

PORTER-CABLE

		List	Sale
9548	HD v/s bayonet saw w/case	255	169
9627	2 sp. tiger saw kit 8 amp	193	130
9629	V/sp. tiger saw kit 8 amp	204	135
505	H.D. ½ sheet finish/sander	175	100
330	spd bloc sander ¼ sheet sz	87	54
304	Professional 7" disc sander	169	120
305	Professional 7" polisher	169	120
7511	3/8" xtrahvy v/s drill 5.2 amp	164	115
7554	½" xtra hvy drill 8 amp	210	150
9652	Versa-Plane Kit	419	285
9118	Porta Plane Kit	289	190

DRYWALL SHOOTERS

7544	5.2 amp — 2500 rpm	158	105
7545	5.2 amp — 0-2500 rpm	158	105

AEG POWER TOOLS

Model		List	Sale
EZ 501	C/less Scrwdrvr **Brand New**	59	35
EZ 502	C/less Scrwdrvr-190 rpm	98	52
EZ 505	C/less Drill/Driver	139	79
EZ 506	C/less Electronic Drl/Drvr	159	94
EZ 581	C/less Caulk Gun var/sp	179	106
SCR1E	Drywall Screwgun 0-2000	125	74
SCR11E	Drywall Screwgun 0-4000	125	74
BE8RL	3/8" var/sp drill 3.8 amp rev	86	51
BE10RL	3/8" var/sp drill 5 amp rev	125	74
SBE401RL	3/8" Ham Drill v/sp h.d.	88	52
SE2E13RL	½" Ham Drill 2 sp h.d.	169	101
TC25E	Tech Driver v/sp 5 amp	150	89
PC70	7¼" Circular Saw 12 amp	157	93
VS130	Orb Sndr 20,000 OPM ⅓ sh	75	48
VS260	Orb Sndr 25,000 OPM ½ sh	156	88
VSS260	Orb Sndr 25,000 OPM w/bag	189	118
Hbse75S	Belt Sander v/sp 3" x 21"	199	118
BSPE60	Jig Saw Orb v/sp 4.6A w/case	214	127
RSK600	Recip Orb Saw 16 amp	229	136

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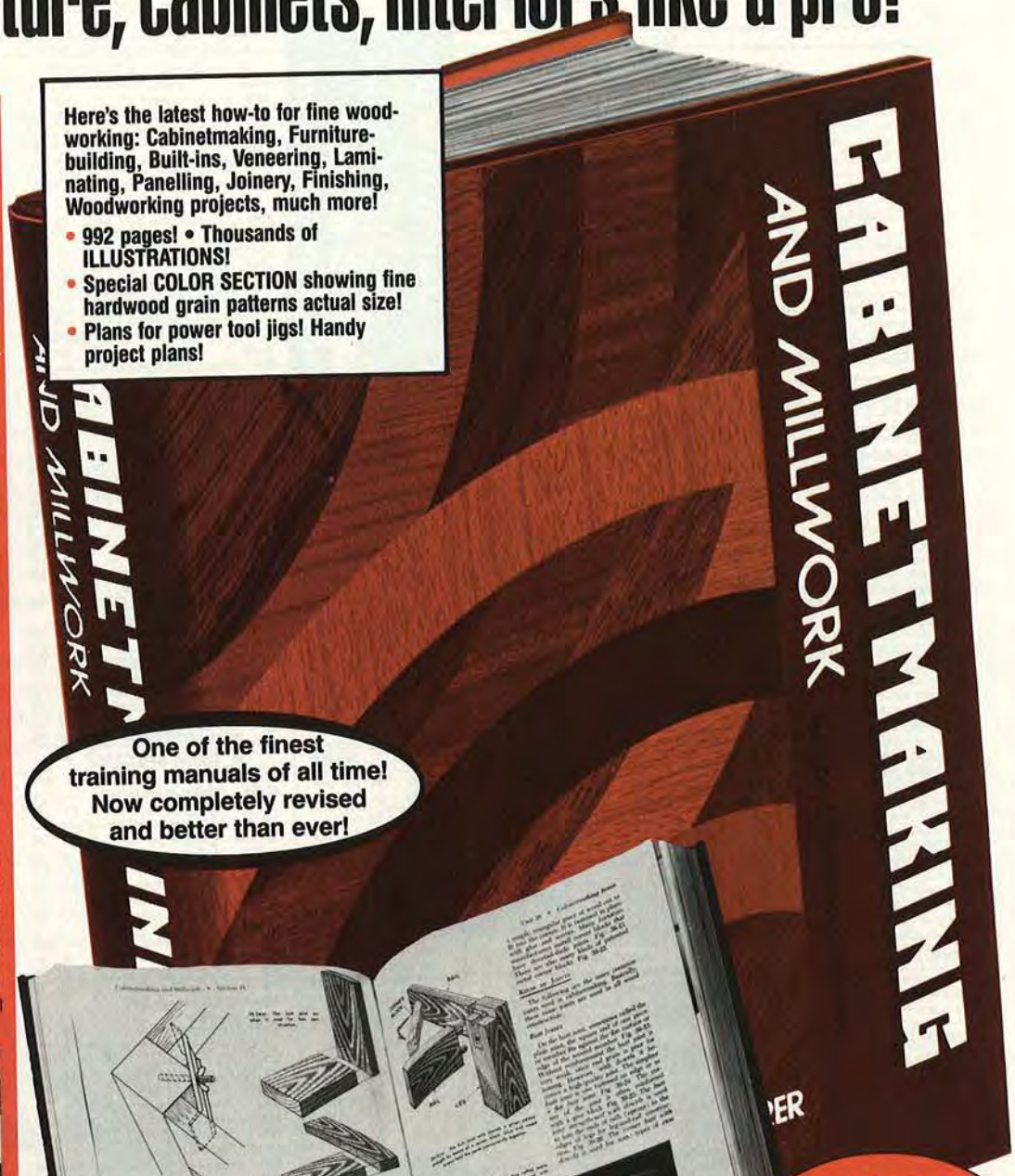

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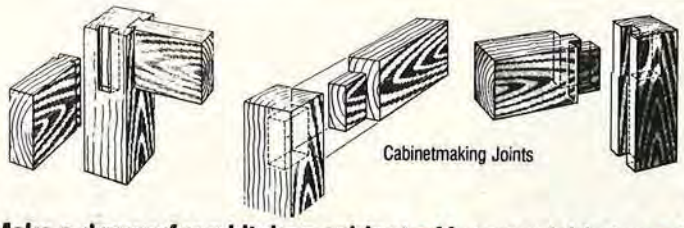

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by John L. Feirer

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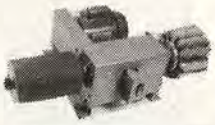

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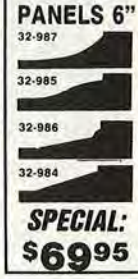

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 16

AEROSOL TOUCH-UP TRICK

Touching up small areas with aerosol paints can be touchy. If you aim the spray at one spot, the paint globs on the surface.

TIP: Through the center of a folded newspaper, cut a hole the size of the spot to be sprayed and center the hole over the spot, as shown *below.* Peak the fold slightly above the surface, and make several quick spraying passes across the hole. The moving spray prevents paint from globbing in one spot, and the raised paper allows some of the residual spray to creep beneath the edges and feather out over the surface.

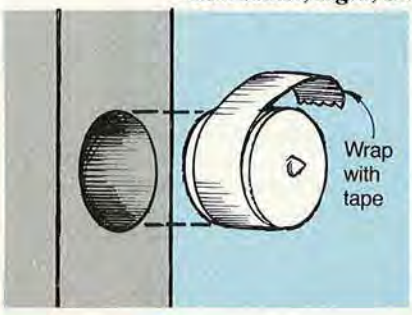
— From the WOOD shop.

FITTING DOWEL CENTERS TO THOSE "ODD" REPAIRS

When repairing old furniture, you often run across odd-size dowels and dowel holes, such as 7/16", for example. What do you do if your dowel center set has none for that size?

TIP: Using the next smaller size dowel center, wrap electrical tape around it until it fits snugly in the hole. Wrap the tape carefully and evenly, so the point remains centered.

— Dan Miller, Elgin, Ill.

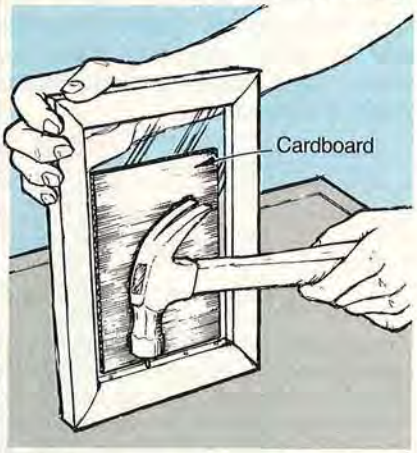


PROTECT YOUR GLASS

If you're not careful, nailing the stops into a picture or mirror frame can be a shattering experience.

TIP: You'll have a better chance of keeping the glass intact if you tape a piece of thin cardboard over it before nailing in the stops. Hold the hammer lightly against the cardboard and slide it up and down to drive the nail.

— From the WOOD shop.



PUSH STICKS THAT STICK OUT

Push sticks have a way of blending in with other scraps of wood around the shop, making them hard to spot when you need them.

TIP: Paint the handles of your push sticks a bright color to make them stand out from the other bits and pieces of wood around the shop. Now you can keep better track of them so they will be handy when needed.

— Terry Leach, Lovington, Ill.

CATCHING TELLTALE GLUE SPLOTCHES BEFORE THEY TATTLE

All too often, you don't notice streaks and splotches of glue film on your project until after *you've started to apply the stain or finish. Then it's too late for an easy fix.*

TIP: You can show up those little smears by wiping all joints and adjacent areas with mineral spirits or lacquer thinner. The glue smears will remain light-colored but the surrounding wood will darken when wetted.

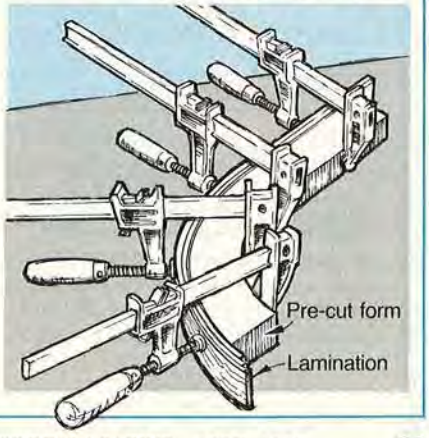
— Frederick Schramm, Magalia, Calif.

OH, GO SOAK YOUR WOOD!

Bending laminations into tight curves can be tricky. The laminations may pop apart after gluing and irregular grain may split.

TIP: The night before you plan to laminate, run hot tap water over the pieces or soak them in a tub of hot water for a few minutes. Then place the pieces in the form and clamp overnight. This pre-forming, though not a cure-all, reduces some of the tendency for laminates to separate and for irregular grain to split.

— Cliff Miller, Loretta, Wis.



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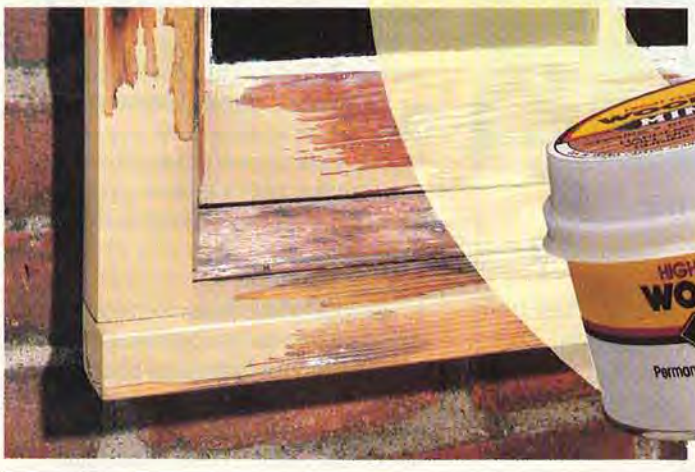

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WOOD ANECDOTE

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YEW
For Witches' Brew

Yew, a softwood, has branches to the ground and provides dense shade. A tough wood, it played a major part in wars of the Middle Ages.

In Europe and the United Kingdom, the densely needled evergreen called yew stands vigil in churchyards and cemetaries. The wood resists decay so well that clergy traditionally cited it as a symbol of eternal life. But since the seeds of its fruit and withering foliage contain poison, it may have been planted in these enclosures to protect the living — both animals and man. Yew, in fact, was considered fatally toxic in Shakespeare's time. He cited "slips of yew" as part of witches' brew in *Macbeth*.

While those who partake of yew may not see another sunrise, the tree itself lives a long time and grows to enormous size. A yew growing at Tandridge Church, in Surrey, England, measures 45′ in diameter, and experts estimate it to be 2,500 years old!

The wood of the yew, because of its toughness, has always been suited for abuse-prone posts and furniture. Yet, yew played a much more important role in history.

The formidable English military weapon of the Middle Ages — the longbow — was made of yew. In fact the law decreed only royal longbowmen could have yew bows. Commoners had to settle for ash and elm. At times, yew became scarce, and the English had to import their bow wood from Spain and Italy. At the Battle of Crecy on August 26, 1346, the English devotion to yew longbows became well-justified. The rapid-firing longbowmen destroyed the French cavalry and carried the day.

In America, the Scottish botanist David Douglas discovered a variety of yew along Oregon's Columbia River in the 1800's. Indians there were using it for bows, too!

Photograph: Bob Calmer
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SOUND ADVICE

Storage strategies for paper-thin veneers

Print this article

Veneers have the reputation of being pretty tough customers once they're installed. But these ultra-thin woods can be cantankerous and downright difficult if not stored right.

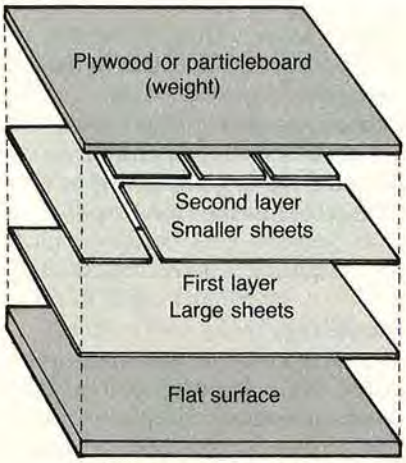
Whether you're dealing with paper-thin 1/64" flexible material or 1/28"-thick stock, the rules for keeping it usable are the same. These tips came from discussions with two veneer pros and from our own project building experiences.

1 ***Keep it flat.*** Most veneers come as flat sheets, although flexible (paper- or adhesive-backed) veneer may be sold in a roll. Always unroll these materials and store flat. Stack pieces on a flat surface with the largest on the bottom, as shown in the illustration. To form the next layer, place smaller pieces side by side, covering as much of the larger sheets as possible.

2 ***Apply light pressure.*** Place a sheet of plywood or particleboard (we use ¾" sheets) on your veneer covering the entire surface. The weight usually provides enough pressure to keep the veneer flat and straighten minor curling. If it doesn't, add weight (a few bricks will do). However, do not try to straighten badly buckled dry veneer with excess pressure because it may crack or split.

3 ***Keep sunlight away.*** Exposure to sunlight (the ultraviolet rays) may cause the veneer to fade or change color. A protective covering of burlap or heavy cloth blocks the sunlight.

4 ***Maintain proper humidity.*** According to Joe Parsi of Artistry in Veneers, veneer has about a 12



PROPER VENEER STORAGE

percent moisture content after cutting and processing. The material should stabilize between 6 and 10 percent in a heated room. Radical changes in relative humidity may cause extreme expansion or contraction and curl or crack the veneer. You can precisely measure the moisture content with a moisture meter, although maintaining a relative air humidity between 45 and 60 percent generally ensures proper moisture stabilization.

So save those scraps after a veneering project. They'll be handy for those patching jobs, for an inlay, or other marquetry projects. Stored right, they will be usable.

How to recover curling veneer

Here's how Alan Fitchett, a noted marquetarian, tackles this problem. Start by applying a light spray of water on the surface of the veneer with a mist bottle. Then, place brown Kraft paper between the pieces and follow the storage suggestions mentioned above, adding some weight if necessary. He cautions you not to use newspaper because the ink may transfer to your veneer.

Allow the veneer to dry; then remove and replace the Kraft paper with new, dry paper, reflatten, and cover with burlap. Allow the treated veneer to stablize 24 to 48 hours before using.

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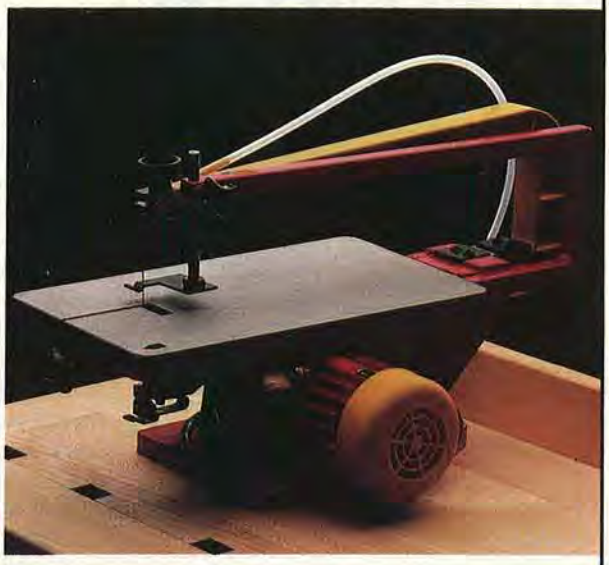

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PRODUCTS THAT PERFORM

Print this article

Here at *WOOD*, we're always looking for products that make life in the woodshop a bit easier, or make a project a bit nicer. When you find a product that really works for you, you tell your friends, right? That's the purpose of this column. We don't always feature the latest products on the market, but ones we think you, as a woodworker, will be interested in. And we test all of them to make sure they meet *our* standards of performance: we hope they'll meet your requirements, too!

A winning combination for bowl sanding

Want to take a lot of the work out of sanding bowls on your lathe? Try using the 3/8" Makita angle drill teamed up with Power-Lock sanding pads to power-sand bowls right on the lathe.

The compact Makita angle drill slips into tight spots and allows better control than standard electric drills for following bowl contours. Its variable-speed control allows precise control over the amount of material being removed.

The Power-Lock pads feature reusable 3" sanding disks that quickly snap on and off the pad — the flexible pad easily conforms to contours. *Makita 3/8" angle drill no. MKDA300R, $114.90 postpaid from Trendlines, 375 Beacham St., Chelsea, MA 02150. Power-Lock Pad no. PP030, $6.35; sanding disks in standard grits from #60 to #320 in packs of 10 for $4.90. Craft Supplies USA, 1644 S. State St., Provo, UT 84601.*

Two unconventional carving tools

Whether you're a new or experienced carver, one of these alternatives to conventional carving sets may be for you.

First-timers will find the X-ACTO Standard Woodcarving Set an inexpensive way to get started. It includes a no. 5 X-ACTO knife handle with 12 interchangeable blades and gouges, adequate for a wide variety of general carving techniques. X-ACTO also offers a large assortment of blades and gouges to fit this tool. Although we felt the cutting angle on the blades was too short and abrupt to make really sharp cuts, they will take and maintain a good cutting edge. So, we suggest regrinding them to a sharper angle. You can use a sharpening stone or wet/dry sandpaper, working from a medium grit down to a 600-grit paper. Follow sharpening with final honing.

If you're interested in power carving, but don't like using the rotary "grinding-type" carvers, check out the AUTOMACH Handcraft Carver. At 10,000 strokes per minute, its reciprocal vibrating action makes amazingly fast, clean cuts through hardwoods and softwoods alike. We found this lightweight carver easy to control. It's much quieter than grinding-type carvers and doesn't produce the sawdust associated with those tools. Includes five different interchangeable blades and a complete instruction manual. *X-ACTO Standard Woodcarving Set no. 5024 $14.95 suggested retail, available from most hobby and hardware stores. AUTOMACH Handcraft Carver HCT-30A: We ordered ours for $199.00 postpaid from Woodcraft Supply Corp., 41 Atlantic Ave., P.O. Box 4000, Woburn, MA 01888.*

It's a small world after all

Make no mistake: the MicroLux palm-size belt sander and drill are mini-sized, but big performers. These pint-sized power tools work just like the big ones, too. Weighing a featherweight 12.8 ounces, the 1″ belt sander tackles finishing chores with delicate efficiency.

The tiny two-speed drill squeezes into impossibly tight working quarters and accepts bits up to ¼″. You change speeds by adjusting the gear ratio, for good torque multiplication. At 5¾″ long, it weighs just 10 ounces. Both tools are right at home in the world of small projects — marquetry, model building, carving, toy making, and fine detail work of all kinds.

The company also offers a tiny right-angle grinder/sander that weighs 11 ounces and measures only 5″ long. Antiques restorers will find numerous applications for this mini-tool. Its 1½″ pressure-sensitive sanding disks will get into some tight places. All three tools use a variable-speed transformer that converts 110-volt household current to 12 volts. *MicroLux Tools: belt sander no. 15229, $49.95; drill no. 15222, $39.95; grinder/sander no. 15224, $39.95; variable-speed transformer no. 15232, $29.95 with one tool, $24.95 with two or more tools. Add $4 per order for postage and handling. Available from Micro Mark Precision Miniature Tools, 24E. Main St., Box 5112-257, Clinton, NJ 08809.*

Lighten up

To match the color of different wood pieces without staining, you often have to bleach the darker pieces. We found that Spe-De-Way Wood Bleach, two-solution kit of hydrogen peroxide and sodium hydroxide (lye water), lightens wood quickly, without leaving a residue. After the wood dries you can finish the project without neutralizing. The 1-pint bottles cover 70 to 120 square feet. Because the solutions are highly caustic, carefully follow safety precautions. *Spe-De-Way Wood Bleach, about $5.85 at most hardware stores and home centers. Also available direct for $5.85 postpaid from Spe-De-Way Products, 8000 NE. 14th Place, Portland, OR 97211.*

Continued on page 32

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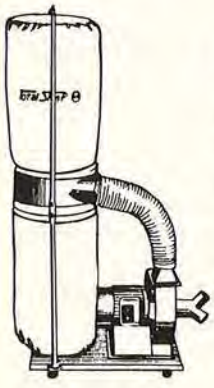

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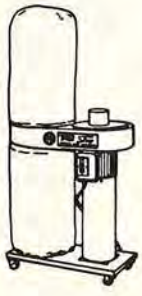

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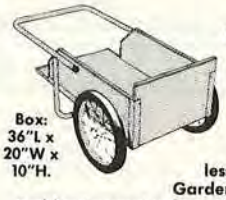

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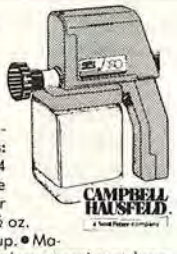

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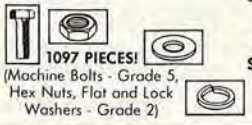

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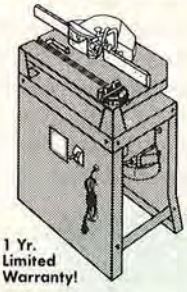

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BUYMANSHIP BASICS

ROUTER BIT VOCABULARY

Arbor: The part of the bit inserted into the router collet. On an assembled bit, the lower part of the arbor also holds the cutter and pilot tip. It may also be called the *shank.*

Assembled bit: A bit made up of several pieces. The arbor usually accommodates interchangeable cutters and pilot tips; also called an *interchangeable arbor.*

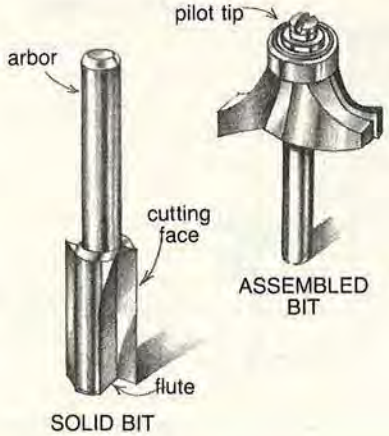
Carbide tip: A tungsten carbide alloy brazed to a router bit's cutting edge to increase bit life.

Cutting face: The cutting part of the bit, which can be either straight or angular (up-shear).

Flute: The opening in front of the cutting edge of a bit that provides clearance for the wood chips. Bits may have one or more flutes, and they may be straight, angular, or spiral. Flutes are also referred to as chip pockets or gullets.

Hook angle: The angle of the cutting face in reference to the center line of the bit. Hook angle affects feed rate and bit control.

Pilot tip: The noncutting portion of a bit that limits the cut and guides the path of the bit by rubbing on the edge of the work. A pilot tip may be a ball bearing or a solid piece of steel.



Radial relief: The clearance angle behind the cutting edge on the periphery of the bit that keeps the bit from rubbing on the work.

Solid bit: A bit machined out of a single piece of tool steel. In some cases, a ball bearing pilot tip is fastened to it. Solid, or one-piece, bits usually have closer machining tolerance than assembled bits.

Stagger tooth bit: A bit on which the cutting edges do not extend the complete length of the flute.

Up-shear: Another term for the inclined cutting face on a bit. The angle of the cutting face shears the chip in an upward fashion.

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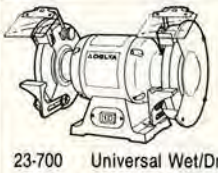

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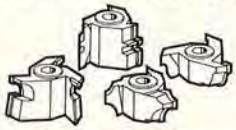

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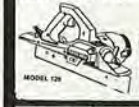

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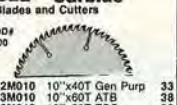

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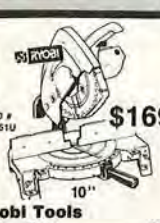
5081DW	Cordless Circ. Saw	102
5402A	16" Beam Saw	299
6012Hdw	3/8" Cordl Scrudrill	94
6300LR	1/2" Rt Angle Drill	169
6301LR	1/2" D-handle Drill	122
6510Lvr	3/8" VSR Drill	69
6801DBV	0-2500 rpm Screwdr	79
6905B	1/2" Impact Wrench	135
6906	3/4" Impact Wrench	299
6419B2W	3/4" Hmr Drill/case	145
9030	1" Belt Sander	125
9207SPB	2 Spd Polisher	123
9501BK	4" Mini Grinder	59
9820-2	Blade Sharpener	159
9924B	3x24" Belt Sander	124
804510	Block Sander	45
DP4700	1/2" VSR Drill	91
HP1020	3/8" Hmr Drill	69
HP1030W	3/8" Hmr Drill/case	95
JR3000V	Var Spd Recipro Saw	109

MAKITA BATTERY PACK SPECIAL
9volt 26.00
7volt 26.00

Belsemeyer Rip Fences

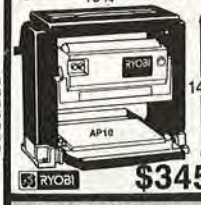
50"	Commercial	282
62"	Commercial	319
98"	Commercial	389
40"	Home/Hop	199
52"	Home/Hop	238



$169

Ryobi Tools

AP10	Planer	345
E3800	0-4000rpm Drywall	79
E3810	0-2500 Drywall Dr.	79
RJ100V	Var Spd Recipro Saw	99
S500A	Block Sander	29.95
SP180	Sander/Polisher	109
TR30	Laminate Trimmer	65
TS251U	10" Miter Saw	169
TS360	14" Miter Saw	319
W200S	16 1/4" Beam Saw	279



$345

Bostitch Nail Guns
up to 50% off Suggested List Price

N16CT	Framing 6d-16d	417
N80S	same as above	417
N70S	Lt Framing	327
T36-50	1/2" crown stapler	282
T35-8	1/2" crown stapler w/shingle gauge	222
T36-16	3d-8d T-Nailer	297
T35-40	Brad Nailer 1"-1 3/4"	282
T29-1	Brad Nailer 5/8"-1"	159
T31-1	same as above	119
T28-5	5/32" crown stapler	222

PREPAID FREIGHT TO 48 STATES ANY ITEM THIS PAGE

Black and Decker Tools

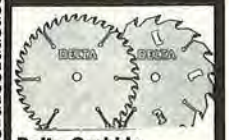
1179	3/8' Drill 0-1200	69
1980	Cordl Dr. w Clutch	99
3051	7 1/4' Worm Dr Saw	122
3103	2 Spd Cutsaw	89
4010-10	Palm Sander	39
6513-09	1/2" Elect. Imp. Wr	109
98003	B&D Battery Pack	35

Bosch Power Tools

11203	1 1/2" Roto Hammer	349
1581VS	Jig Saw Orb. Action	124
1601	1Hp Router	89
1604	1 3/4 Hp. Router	115
1921vsr	Cordless Drill 3/8"	99
1921vsrk	Cordless Drill 3/8"	89
90-300	3 1/4 HP Router	350
1942	Heat Gun	59
3230	Jig Saw	49
11305	30 lb. Demo. Hammer	565

BOSCH. Top Handle, Orbital Action Jig Saw Model 1581VS

$124



Delta Carbide Blades and Cutters

35-600	9"x80T TC&F	58
35-625	10"x80T TC&F	75
35-604	9"x64T ATB	49
35-623	10"x60T ATB	69
35-677	14"x108T ATB	89
35-647	12"x72T ATB	79
35-626	10"x60T ATB	49
35-560	8" Carb Dado Set	99

Selected DELTA Shaper Cutters up to 50% off Suggested List Price

43-921	Cabinet set	165
43-922	Cabinet set	169

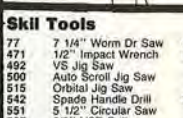
Milwaukee Tools

OUR PRICE $109

0228-1	3/8" VSR Drill	89
0222-1	3/8" VSR Drill	98
0234-1	1/2" VSR Drill	109
0566-1	Drain Cleanier	179
1007-1	1/2" Drill SC	148
1250-1	1/2" Drill	148
1610-1	1/2" Spade Hndl Drill	139
1630-1	1/2" Compact Drill	148
1670-1	1/2" Hole Hawg	195
3002-1	Rt angl Electricians Drill	179
3107-1	Rt angl Drill Kit	204
3300-1	Rt angl Magnum Drl	195
5347	1½" Rotary Hmr	399
5399	1/2" Hammer Drill	179
5455	7"/9" Polisher	136
6012	Orbital Sander	118
6095	9" Sander/Grinder	104
6215	Chain Saw	143
6377	7 1/4" worm Drive Saw	143
6511	2 Spd Sawzall, case	119
6539	Cordless Screwdriver	69
6543-1	0-1000 rpm Screwdriver	149

Hitachi Power Tools

D10V	3/8" VSR Drill	89
D13	1/2" Spade Hndl Drill	99
DRC10	3/8" Cordl Scrudrill	74
F20A	3 1/4" Planer	69
TR6	Laminate Trimmer	83
TR12	3HP Router	169
C7SA	7 1/4" Circular Saw	65
W6VA	0-2500 Screwdriver	79
CR10V	Var Spd Recipro Saw	107



$74

Skil Tools

77	7 1/4" Worm Dr Saw	134
471	1/2" Impact Wrench	139
492	VS Jig Saw	49
500	Auto Scroll Jig Saw	49
515	Orbital Jig Saw	59
542	Spade Handle Drill	109
551	5 1/2" Circular Saw	72
597	3/8" VSR Drill	59
598	1/2" VSR Drill	69
7565	Palm Sander	39
2016-2	3/8" cordl vsr Drill	95
1400	4x21 3/4" Belt Sndr	135

$134

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PRODUCTS THAT PERFORM

Continued from page 29

Tough on finishes, easy on your skin

You won't see TV commercials for this high-powered hand cleaner during the afternoon soaps, but here's how one might go: "Tired of using harmful solvents to clean your hands after using stains and paints? Then, try *Nitro-Kleen.* Here, at the *WOOD* shop, we use it to clean everything from epoxy to polyurethane off our hands. And it leaves them smooth and fragrant. So, the next time you find your hands the same color as the furniture you just stained, reach for *Nitro-Kleen.*"

All kidding aside, we've found this hand cleaner excellent for removing lacquers, enamels, stains, and other finishes, without irritating skin. It's nonflammable, biodegradable, and water-soluble. *Nitro-Kleen, 4½-oz. tube $2.65, 4½-lb. can $11.95. From Standard Coating Corporation, 461 Broad Ave., P.O. Box 56, Ridgefield, NJ 07657.*

Double-barreled adhesive is fast on the dry

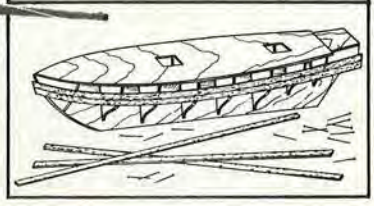
Until recently, the biggest problem with two-part epoxy adhesives was accurately measuring and mixing the resin and hardener. This fast-setting epoxy has a convenient dispenser, shown *above*, that eliminates guesswork and requires only a thorough blending of the epoxy resin and hardener for sure-fire bonding. This glue sets in just 5 minutes (it reaches full-bonding strength in one hour), even at low temperatures. It bonds wood, metal, glass, china and ceramics, and some hard plastics. *Devcon 5-Minute Epoxy, available nationwide at hardware stores and home centers for about $2.50.*

Build This Beautiful Wooden Ship Model

No. AL139TM.

Special Offer for those who have never built a ship model before!

Now Only $29.95!



Wouldn't you love to build this historic ship model? It's a true-to-scale, 21" replica of the 2-masted schooner *Swift*, a Virginia pilot boat of 1805. Well, now you can! And you don't have to be a skilled craftsman to do so.

It really isn't hard

Even if you've never built a model before, you can experience the relaxing pleasure and pride of accomplishment that is offered by this fascinating hobby. You can build the *Swift*. The secret's in our kit, designed especially for the first time modeler, with pre-cut parts that make assembly easy. Clear, large scale plans and instructions that virtually take you by the hand and guide you every step of the way through hours of the most relaxing fun you'll ever have. And when completed – a museum quality model you'll display with pride, with gleaming brass fittings, walnut planked hull, delicate rigging – lifelike in every detail.

Quality you can see and feel

The materials in our kit may be better than those used in the original *Swift*. The keel section and frames are pre-cut plywood, ready for quick assembly. The *Swift's* hull is planked twice; once with thick, flexible limewood for strength, then overlaid with planks of African walnut for lasting beauty.

You don't have to make the fittings – we've done that for you. Our kit contains ready-to-use blocks and deadeyes of rare, yellow boxwood. We include eyelets, bracers and belaying pins – over 70 parts of solid brass! Even the cabin door hinges are brass, as are the 250 miniature nails you'll use to fasten the planking to the hull and deck. And, since the original wooden *Swift* had no plastic parts, our kit doesn't either – anywhere!

Creative? And how! Overwhelming? Not a bit! But be prepared for hours of the most challenging, engrossing, relaxing fun you've ever had.

An "everything you'll need" special offer, with free tools and handbook.

We want to introduce you to this great hobby, now! So we've made it easy for you to get started. Our special offer includes the *Swift* kit plus all the tools you'll need to build her: pliers, hammer, knife, file, tweezers, sandpaper, glue, wood oil, and more. You'll also receive a free copy of "Ship Models from Kits," a 110 page beginner's guide. You don't have to buy anything else. The tools normally cost $17; the book retails for $7.95. But they're yours, FREE when you buy the *Swift* kit at its regular low price of $29.95 (plus $3.00 for delivery).

Credit card holders order toll free. Call **800-228-5588.** 24 hours a day. Or use the coupon below to send check or money order. Order kit **No. AL139TM.**

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Please send me _____ kits of the *Swift* (No. 139TM) at $29.95 plus FREE tools, books and cannons. Check or money order enclosed. (Add $3.00 for delivery. N.J. residents must add 6% sales tax.)

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Address _____

City _____

State _____ Zip _____

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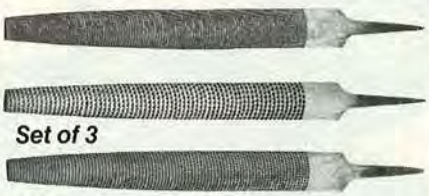
Set of 3 Flush Mounting
BENCH STOPS
Easy to install, easy to use. Just raise the jaw and press your workpiece against the teeth. Especially useful when positioned opposite a shoulder vise with built-in "dog".
300-0004

Our Indispensable
HONING GUIDE
Maintains the proper angle for accurately honing any chisel or plane blade up to 3" wide. Complete instructions included.
103-0140

DIAMOND GLASS CUTTERS
They work equally well on stained-glass, irregular shaped cuts, or simple window panes. Hardwood handle, brass ferrule.
106-0050
Diamond Glass Cutter for cutting glass up to 3/32" (window glass)
106-0060
Diamond Glass Cutter for cutting glass between 3/32" and 1/4"

CARBIDE TIPPED KEYHOLE ROUTER BIT
Cuts keyholes for hanging picture frames and plaques with a screw or nail. 1/4" shank, 3/8" overall length.
200-0741 Carbide Router Bit

Self-Centering
HINGE & BUTT DRILLS
For perfectly centered holes for hinges. 1/4" shanks. Set of 2, for #6, #8, #9 and #10 screws.
200-2601



Set of 3
HALF ROUND WOOD RASPS
1 each Smooth, Medium and Coarse cut. An extraordinary value from China.
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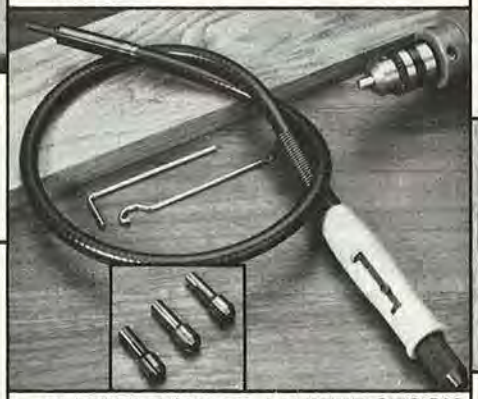

FLEXIBLE SHAFT: LIMITED STOCK
38" flexible shaft with 3 collets to hold all 3/32", 1/8" and 1/4" shank accessories. A finger guard slides over the revolving chuck to provide better working control and protection. Usable with drills and motors operating up to 3500 RPM. A Disston product with a suggested retail price of **$19.00**
202-0175 Flexible Shaft with 3 collets . .

Set of 3
INDESTRUCTIBLE PHILLIPS SCREWDRIVERS
Companions to the 4 piece set. 6", 8" and 10" overall. #1, #2, #3 Phillips.
102-0045

ONE HAND SCORP
A very sharp, roughing out tool for hollowing, scooping and scraping wood projects such as chair seats, bowls, spoons and other objects with a hollow in their design. Quite suitable for removing excess wood quickly. The oak handle is offset to provide hand clearance.
104-6800 One Hand Scorp

Made to Sell For $50
Lightweight, Unbreakable
4" LOCKJAW VISE
Made of a virtually unbreakable space age alloy, with a patented, rear tilt jaw for holding irregularly shaped work. Specially configured 4" magnesium jaws. 3" jaw opening.
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CAT'S PAW NAIL PULLERS
Two thin, sharp claws on the end will withdraw small finishing nails. The rounded base minimizes marring. Exceptional value.
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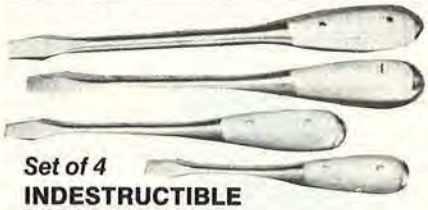

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The blade and handle are a single forging, with a smooth, oval shaped hardwood grip riveted to each side of the handle for comfort. So tough you can hammer them like chisels. Set of 4: 6", 8", 10" and 12" long overall.
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SAVE UP TO 50%

22 Piece

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21 bits to countersink, counterbore screws sizes 4 to 14. A depth stop is included so you can prevent countersinking on all but the smallest bits. Less than 50¢ a bit! You get bits for:

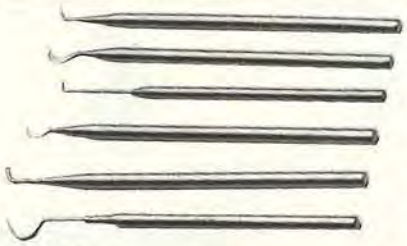
#4 & #5 screws	1/2", 5/8", 3/4", 1" long
#6 & #7 screws	5/8", 3/4", 1", 1 1/4" long
#8 & #9 screws	3/4", 1", 1 1/4", 1 1/2", 2" long
#10 screws	1", 1 1/4", 1 1/2", 2" long
#12 & #14 screws	1", 1 1/4", 1 1/2", 2" long

200-0125

TRADITIONAL HOLDFASTS: A PAIR

Drill a 5/8" hole in your bench. The holdfast shank goes in the hole and its arm will hold your work tight on the bench if you strike the head from the top. To release, tap the back of the head. Overall 8". From shank to pad under arm is 4".

300-0813 Pair Holdfasts



Set of 6

DENTAL INSTRUMENTS

First quality, stainless steel instruments. For modeling, probing, sculpturing and other delicate work.

106-0007

RATCHET TAP WRENCH

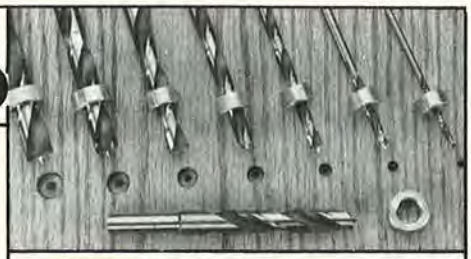
All inner mechanisms, ratchet and chuck are correctly heat treated and tempered. Chrome plated. Two jaw. Capacity 1/8"-3/8".

300-0025

3 HAMMERS

Three, sixteen ounce, drop forged, fully polished hammers with hardwood handles. No need to run to the workshop anymore when you need a hammer.

105-0009 3 Forged Hammers



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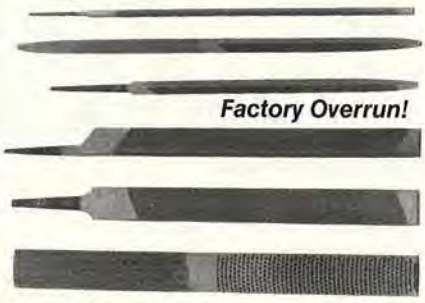
You get 7 drills, 7 stop collars for the price of the drills alone. Brad point bits for straight, accurate holes in wood with no skipping, no skating, no dancing. 1/8", 3/16", 1/4", 5/16", 3/8", 7/16" and 1/2" sizes.

200-0060



Factory Overrun!

6-PIECE FILE SET

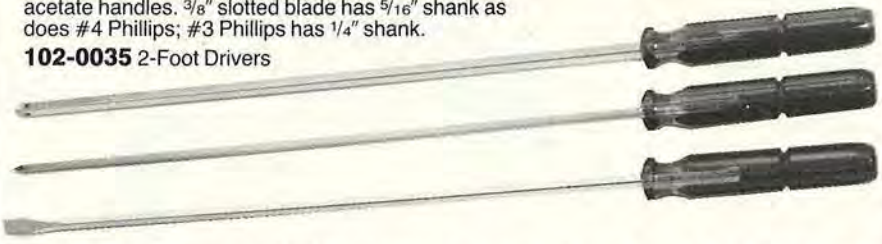
Made to sell for far more. 10" Double Ended Saw File, 8" Cross Cut File (wedge shape, round back), 8" Mill Bastard File with 2 round edges, 7" X-Slim Taper, 8" x 3/16" Fine Cut Parallel Round File and a 4-in-1 10" Shoe Rasp (combination file and rasp).

117-1160

2-FOOT SCREWDRIVERS

18" chrome vanadium, square shank, steel blades, 6" acetate handles. 3/8" slotted blade has 5/16" shank as does #4 Phillips; #3 Phillips has 1/4" shank.

102-0035 2-Foot Drivers



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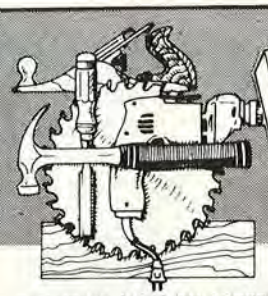

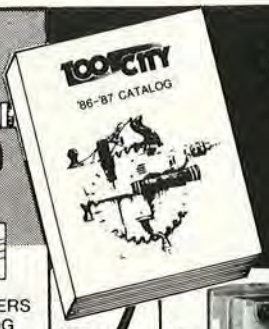

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FB100	16pc Forstner bit set	249	**139**
DB050	50pc Drill bit set	89	**69**
WC106	6pc Chisel Set	47	**26**
WC110	10pc Chisel Set	80	**46**
TT108	8pc Turning Set	81	**46**
CS106	6pc Carving Set	89	**54**
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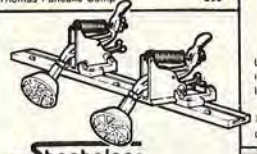

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ELM

The hard-as-nails hardwood with beauty a burl deep

Throughout history, man has chosen elm when he needed a tough and durable wood. Wheelwrights fashioned wheel hubs from nothing but the rugged elm, then used it to floor long-lasting wagon beds. The Chinese called elm *yümu* and worked it into utilitarian furniture that could take abuse. Fine furniture makers called on elm, too, but in the form of burl veneer from a species growing in Europe's Carpathian Mountains.

In early America, Iroquois Indians tempered fever with a medicine derived from the inner bark of the slippery elm. Years later, players in the new game of baseball chewed this same elm bark to produce a sticky saliva, which when rubbed into the pocket of their glove, made balls easier to catch.

Despite its many uses, elm's primary fame has come from its graceful beauty and the shade it provides. From France to Middle America, elm once lined miles of city streets and country byways. Today, unfortunately, elm trees are being killed by a spreading fungus called "Dutch" elm disease. Efforts to control the disease haven't been successful. Fortunately, the propagation of hybrid, disease-resistant trees shows promise.

Wood identification

Elm claims about 20 species in the temperate regions of the world. The most well known include the stately American elm (*Ulmus americana*) and the slippery elm (*Ulmus rubra*) of the United States, and the English elm (*Ulmus procera*) in Europe and Great Britain.

American elm

Slippery elm

Carpathian elm burl veneer

In the forest, elm often grows 140′ tall. But open-grown elms rarely reach that height. Instead, they form a spreading, umbrella-like crown valued for shade.

The English and American elms have deeply fissured bark with criss-crossing ridges of an ash-gray color. The bark of slippery elm is the same color, but lacks pattern.

You can easily identify elm by its leaves. About 5″ long and 3″ wide, they have saw-toothed edges ending in a sharp point.

Elm heartwood ranges in tone from reddish brown to light tan, while the sapwood approaches off-white. The usually dramatic grain resembles ash. Moderately dense, elm weighs nearly 40 lbs. per cubic foot dry.

American and slippery elm will root practically everywhere east of the Rocky Mountains (except for the high Appalachians and the southern tip of Florida). You'll find elm growing in river bottoms and on low, fertile hills mixed with other species of hardwoods.

Working properties

Hard and tough, elm still bends easily when steamed, and when dry, holds its shape. Its twisted, interlocking grain makes elm difficult to work with anything but power tools. It also won't split when screwed or nailed, but demands drilling pilot holes. And the wood sands easily to a natural low luster.

Burl veneers tend to be brittle and troublesome to flatten. Try those with flexible backing.

Uses in woodworking

Besides the frequent use of its veneer for paneling, furniture makers take advantage of elm's ruggedness for hidden furniture parts. You'll often find it in chair and sofa frames, backs, and legs. Yet elm's beautiful wood grain also has fine furniture possibilities.

Elm works well, too, for butcher block tops and cutting boards because it has no odor or taste, and it won't split. When in contact with water, elm resists decay, so many boatbuilders use it for planking.

Cost and availability

Today, most elm lumber goes for manufacturing use and very little finds its way to retail outlets. Where you do find it—usually at small, local sawmills—it costs less than $2 a board foot compared to nearly twice that for oak and walnut. Native elm veneer sells for about $1 per square foot—Carpathian elm burl about double that.

Photographs: Hopkins Associates
Illustration: Steve Schindler

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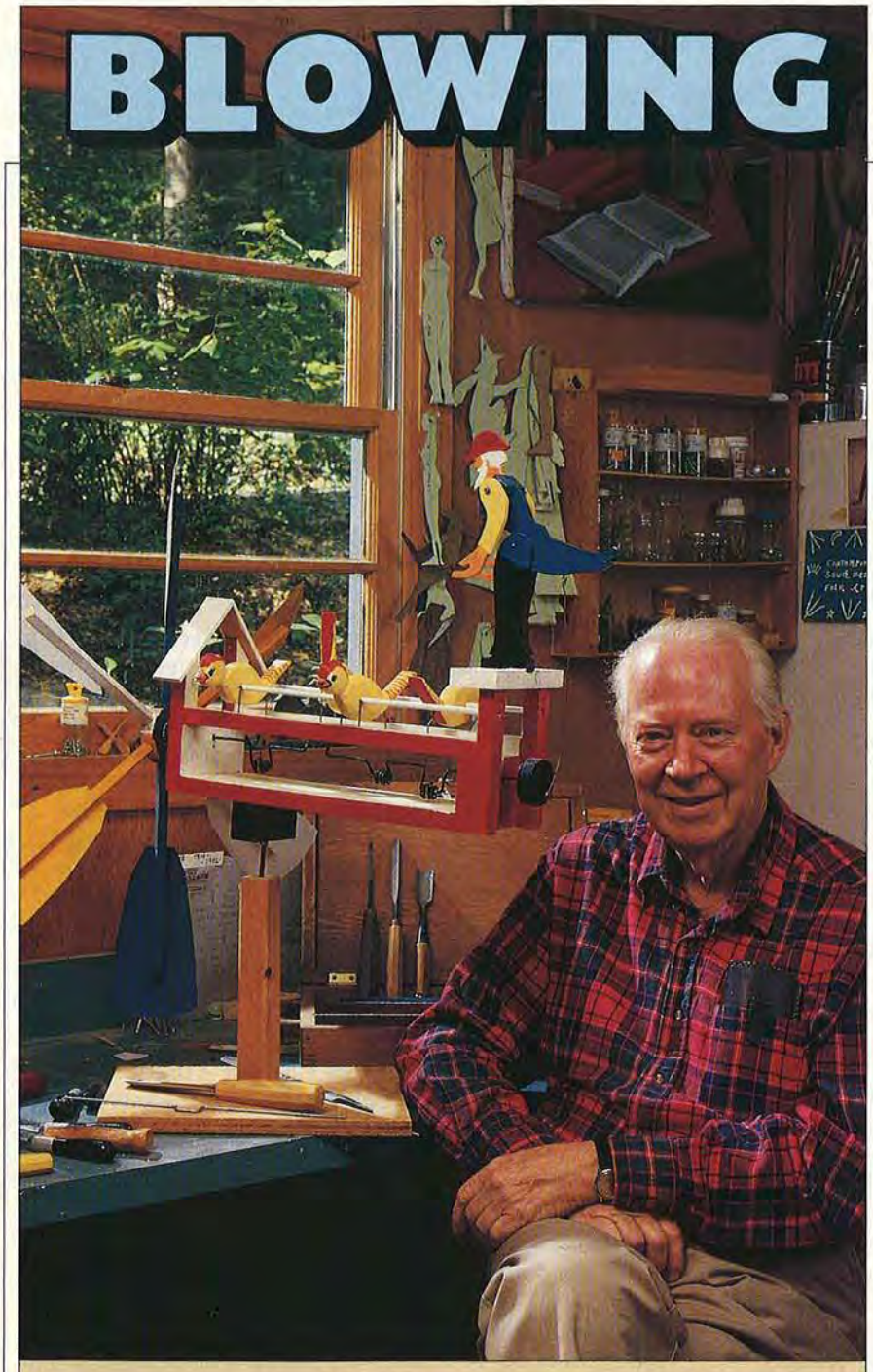
BLOWING IN THE



Always a whittler, Anders S. (Andy) Lunde, *above,* looked forward to retirement so he could spend more time at carving. When retirement came about 10 years ago, he discovered whirligigs. In fact, through research and tinkering, he discovered so much about "wind toys" since that he's written two books on the subject, crafted hundreds, and has become a recognized whirligig authority. After reading one of his books, we had to meet him. In Chapel Hill, North Carolina, where Andy lives with Eleanor, his wife, we did just that.

We found the former demographer (he worked with population health statistics for the U.S. government) busy in his workshop with his favorite pastime. Andy had just fine-tuned his mechanical whirligig "Feeding Chickens", seen at his elbow, and chuckled at the scene.

"If you learn how to make a propeller, and understand how the balance must work, you'll be able to make a whirligig," claims Andy Lunde. Smiling, he points around his workshop to the proof: bird whirligigs, people whirligigs, fantasy whirligigs, do-nothing whirligigs, do-something whirligigs. "The only limit is your imagination."

Andy hasn't found that limit yet. In the years he's been making whirligigs, Andy has mimicked rural life, airplanes, acrobats, swimmers, soccer players, animals, and industry. A large mechanical whirligig he made, representing a ship — of sorts — now resides in a North Carolina Museum of History exhibit. It measures nearly 5' long and had five propellers activating three figures! The Smithsonian has shown his work, and so has Winston-Salem's Southeastern Center for Contemporary Art.

Ideas for whirligigs never elude him. "I write every one down," he says. And when Andy's not building a whirligig, he's sketching one out on a drawing pad.

Admittedly, Andy's hooked on whirligigs. Yet, the first one he tried building was almost a dismal failure.

Making a whirligig whirl

"Eleanor gave me a book shortly after I retired. It was about antique weathervanes, and she thought I could find some designs in it to carve," Andy relates. "The last chapter was about 'wind toys' and as soon as I saw the photographs I knew I wanted to make them. As a kid in Connecticut I had seen them, and they were sold along the roadsides during the Depression, but I'd never made one."

From another book, Andy copied an arm-waving whirligig that dated back to 1807. "I made it exactly like the photograph, but when it was finished, it wouldn't work," he remembers.

WIND Whirligig craftsman Andy Lunde revives a colorful folk art

Surprised, but not discouraged, Andy remade the arms. Still, they only flapped before coming to a halt. Then it hit him. "The arms had to be propeller-like, but in two parts! When I made the arms that way, they spun like crazy and I had the secret!", he exclaims.

Andy figures the example in the book had at one time been broken, then incorrectly repaired. He's found that to be true with many museum whirligigs: "They weren't made to last. Whirligigs were simply built for amusement, like most folk toys."

Now, when Andy plans a propeller he knows that its blades must be pitched about 45°, no matter what shape they take on. He's fashioned propellers in the shapes of arms, legs, wings, and even rowboat oars and canoe paddles. "I play a little game with these," he says, "and say to myself 'I am the wind. How will this turn if I hit it?' It always seems to work."

In Andy's workshop, which he built in a shaded setting apart from the house, you'll find a staggering array of propellers. He makes them like traditional airplane propellers, such as the one he's carving, *above,* as split propellers that become pairs of arms, legs, or wings, and as multi-bladed types that turn with enough power to activate mechanical whirligigs. To make sure they'll work, he tests all propellers in front of an electric fan.

Andy cautiously carves away wood to thin down a propeller. Behind him are whirligigs with multibladed propellers and split "wing" propellers.

Andy has two cautions regarding whirligig propellers:

1. "Don't make the blades too narrow, or they won't have enough surface to catch the wind."

2. And, regarding multi-bladed propellers designed to operate mechanical whirligigs, "make them only large enough to do the job you want them to."

A very large propeller (in proportion to the whole assembly) can tear a whirligig apart. Test it with a fan to make certain it will activate all the moving parts.

Pointing a whirligig into the wind

If a whirligig can't catch the wind, its propeller(s) will never whirl. So, a true whirligig must also turn into the wind.

Andy accomplishes this by drilling a vertical hole he calls the socket, in the base of his whirligigs. Set in place on a spindle made from a large common nail slightly smaller in diameter than the socket hole, the body of the whirligig has enough mass to be blown and turned, much like a weathervane, so that the propellers receive the wind and whirl.

But, cautions Andy, you can't just drill the socket in the center, as you might expect. Arm-waving whirligigs have an imaginary vertical center line running from top to bottom of their bodies. He has found that for the body to turn, the socket has to be either slightly behind or ahead of the center line.

"In most cases, I offset the socket from less than ⅛" to ¼". Whether you drill it in front or in back depends on where the propeller hub or axle will be located," Andy advises. "If you locate the propeller hub slightly ahead of the vertical center line, the socket gets set back about the same distance, and vice versa." (See the whirligig drawing on page 41.)

Continued

ANDY'S WONDERFUL WORLD OF WHIRLIGIGS

How many kinds are there? Andy classifies whirligigs into four types: mechanicals, like "Feeding Chickens", *opposite page;* weathervanes, such as "Fantasy Boat", *left*; winged, represented by "The Swimmer", *right,* and perhaps the most classic of all, the arm-waving, seen as "The Woodworker" on the next page.

As whirligigs blow in the wind, they can "do something or nothing, as long as they're fun to watch," says Andy. "They should bring a smile to your face and maybe even make you laugh."

BLOWING IN THE WIND

Of course, since each whirligig is different, Andy says you still have to experiment to see if his rule of thumb holds true. He often checks by boring three holes: one on center, one back, one forward.

On large, horizontal whirligigs, like his mechanicals and weathervane models, Andy uses a simpler strategy. "Find the center of the piece by balancing it on your finger or a pencil. Then make a mark for the socket about halfway between the center and the front of the whirligig," he notes. "Remember, though, adding a heavy propeller up front can change these locations."

The "by guess and by golly" of mechanical whirligigs

An inveterate tinkerer by nature, Andy beams when he talks about mechanical whirligigs, because tinkering is what they're all about. "You're dealing with engineering problems without any set rules."

In a mechanical whirligig, Andy connects the propeller to a long piece of ⅛" steel welding rod which he calls the camshaft. The propeller turns the camshaft. To make a figure on the whirligig move, Andy bends a U-shaped cam into the shaft — then attaches the figure's arms or body to the cam. The cam's eccentric motion makes them move up and down.

Andy, though, has developed

Andy always has to work out engineering problems. Eventually, the skeleton will shake, and the woman's arms will rise in terror.

Fine tuning his new creation, Andy fastens the wire to the cam. Surrounding him are examples of a variety of propellers.

Traditionally, whirligigs of this type depicted men carrying the tools of their trade. Soldiers brandished swords, farmers swung shovels, and woodsmen carried axes. Our woodworker has a back saw in one hand and a board in the other. He's easy to make. If you're a little shy on carving talent, don't worry. Most folk craftsmen weren't carvers, and their work often was roughly done.

THE WOODWORKER — *An arm-waving whirligig*

CUTTING OUT THE BODY

1 Reproduce the patterns for the body and arms full-size on graph paper. Then use carbon paper to transfer the patterns to your stock. Mark the positions of the axle hole where the propeller axle will go through, and the pivot hole where you'll locate the socket. Mark the axle holes on the arms.

2 Drill a 3/16" hole through the body for the axle. Next, drill a 7/32" hole 1½" deep through feet for socket. Insert the 7/32" diameter x 1½" long brass socket liner. Cut ¼" off the point end of a 16d nail, smooth the cut surface, then push the point end up through the socket liner and tap into the wood. This prevents the spindle from penetrating the whirligig body.

3 Saw the body to rough shape, or carve it entirely. When you've finished the body, insert the 3/16" diameter x 1¾" piece of brass tubing through the axle hole.

MAKING THE PROPELLER ARMS

1 Drill a ⅛" hole ½" deep in each arm.

2 Carve the wood on each arm to ⅛" thick beyond the shoulder, maintaining the 45° angle shown.

3 When you have completed the arms, insert the 3" length of ⅛" steel rod through the body. Slide the arms onto the rod and check them for equal weight and balance.

ASSEMBLING THE WHIRLIGIG

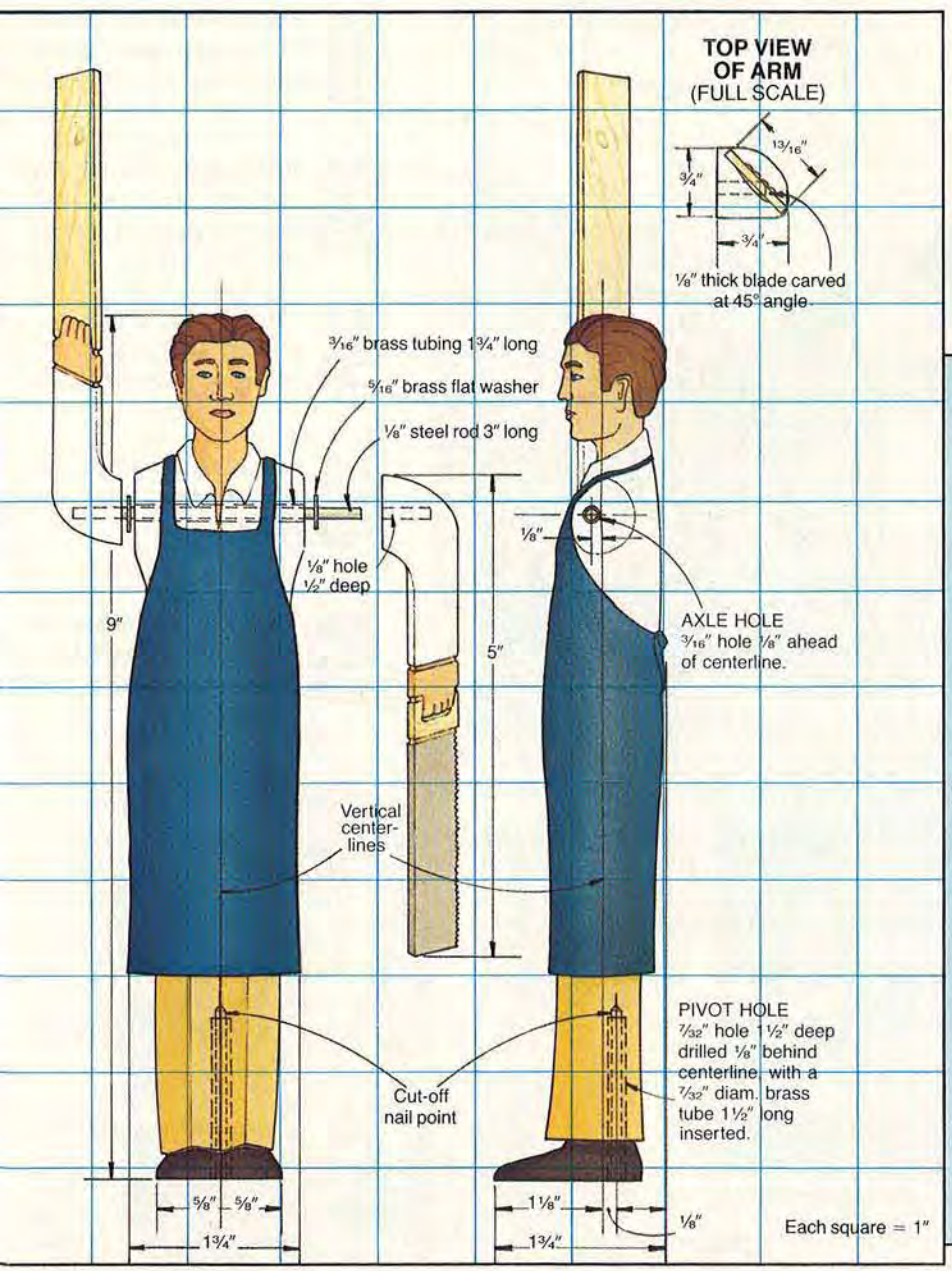
1 Paint the body and arms. Slide the axle rod through the body and place a flat washer on each end. Dab a spot of epoxy in the hole of each arm and insert the arms on the rod.

2 Mount the whirligig on a stand made of a 3x3x¾" scrap block with a 16d nail (point cut off and slightly rounded) driven up through the center. To mount outdoors, drive a 16d nail into a pole end, then trim off the head.

options to this basic setup. He'll often connect a figure or a shape, such as a flag, to a cam with stout wire in order to transfer the motion a longer distance. Or, he may use a wooden toy wheel on the shaft as a cam by attaching a wire to it off-center, then running the wire to the figure he wants activated.

It's all by guess and by golly, but Andy loves the challenge of making a mechanical whirligig work. He's learned to make scale drawings of the figures and mechanisms so he can calculate cam positions, wire length, and where to put the figures. Andy may spend several days just drawing and calculating a complex mechanical whirligig. Yet, time-wise, he doesn't invest as much as another whirligig maker he's heard about.

"At a mountain crafts fair in eastern North Carolina, a man told me his dad would spend months working on one whirligig with lots of handmade wooden gears and dual propellers — a real mechanical marvel. I don't know if I could be that patient," Andy says.



Materials: Most anything on hand will do

According to this master maker, whirligigs were never elegant. Rough-hewn and crudely carved from scrapwood, they were assembled with materials the builder had available. Even today, you can make them with anything you happen to have on hand. With whirligigs, ordinary hand tools, a little common sense, and ingenuity go a long way.

Andy uses ponderosa pine, New England sugar pine, and sometimes basswood (for carved bodies). The idea, however, is to express yourself, believes Andy. Whirligigs should be somewhat spontaneous. And they should be fun to build. After all, the early folk craftsmen had a lot less to work with.

Ready to make a whirligig? Follow the instructions on the bottom of these two pages to build "The Woodworker," a wind toy Andy designed just for you.

Note: Andy advises that the brass tubing (from hobby stores) lining the axle hole and pivot socket only keeps the wood from wearing. Your whirligig will last a long time even if you don't use it.

Bill of Materials	
Figure	2x2x10" pine
Arms	3/4x3/4x5" pine (2)
Axle	1/8x3" steel welding rod
Lining, axle	3/16x1 3/4" brass tubing (optional)
Lining, socket	7/32x1 1/2" brass tubing (optional)
Washers	5/16" brass flat (2)
Supplies: paint, epoxy, 16d nails, scrapwood	

For more information about whirligigs, read: ***Whirligigs: Design & Construction,*** *by Anders S. Lunde, 2nd ed., 1986, Chilton Book Company, Radnor, PA 19089-0230, $10.95*

Produced by Peter J. Stephano
Photographs: Hopkins Associates
Drawings by Bill Zaun
Whirligig designs by Anders S. Lunde

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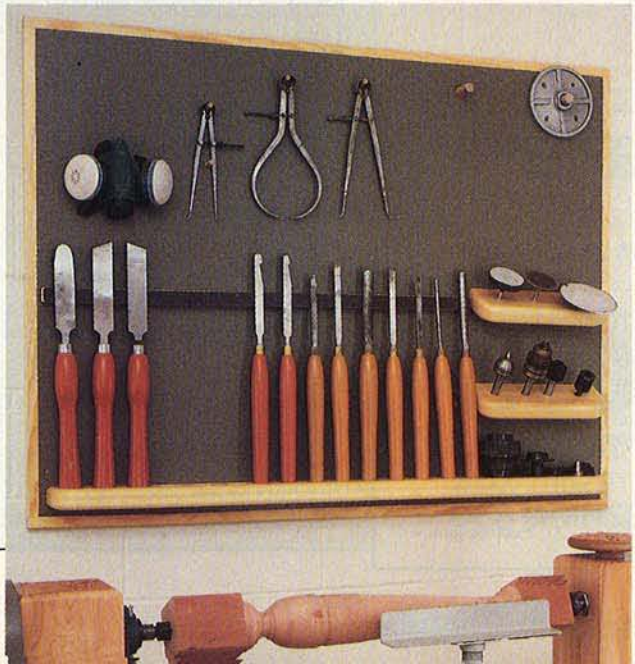
5 WITH OUR 5 SUPER SHOP ORGANIZERS

If you're like us, you don't like hunting around for your tools when you could be working on a project. With our five convenient shop organizers, you'll spend less time cursing and more time working! We've found them to be real time-savers in the *WOOD* shop.

1. **Super-smooth sander/sandpaper cabinet, page 43. *Above.***
2. **Wall-hung board for router and accessories, page 47. *Far left.***
3. **Under- and over-table clamp-storage combo, page 44. *Left.***
4. **Lathe tool and accessory board, page 46. *Below left.***
5. **Three-compartment cabinet for drill bits, page 45. *Below.***



Photography: Craig Anderson

1 ALL-IN-ONE SANDER CABINET

You'll spend less time gritting your teeth and more time sanding when you store everything you need — sanders, sandpaper, and sanding belts — in one convenient wall-hung cabinet. The cabinet accommodates a portable belt sander and a palm-grip sander.

1 From a sheet of ¾" particleboard, lay out and cut parts A through I to finished size. (We cut E and F to size plus 2" in length to allow for ease in bevel-cutting these pieces later.)

2 Bevel-cut the front end of the shelves for the two sanders (E, F) to a 60° angle; the back end to a 30° angle. Cut dadoes in the shelf dividers (D) and inside the right-hand side (C) where shown on the drawing.

3 Glue and screw the back (A), bottom (B), and sides (C) together. Then, glue and screw the cleats (J, K) and the slanted shelves (E, F) in position. Drill two holes in the back for screws or wall anchors, according to wall-stud spacing.

4 Loose-fit the shelf dividers (D) and shelves (G, H), starting with the left-hand divider and working toward the right-hand one. As you slide in the center and right-hand shelves (H), glue in the false back (I) for each shelf where shown on the drawing.

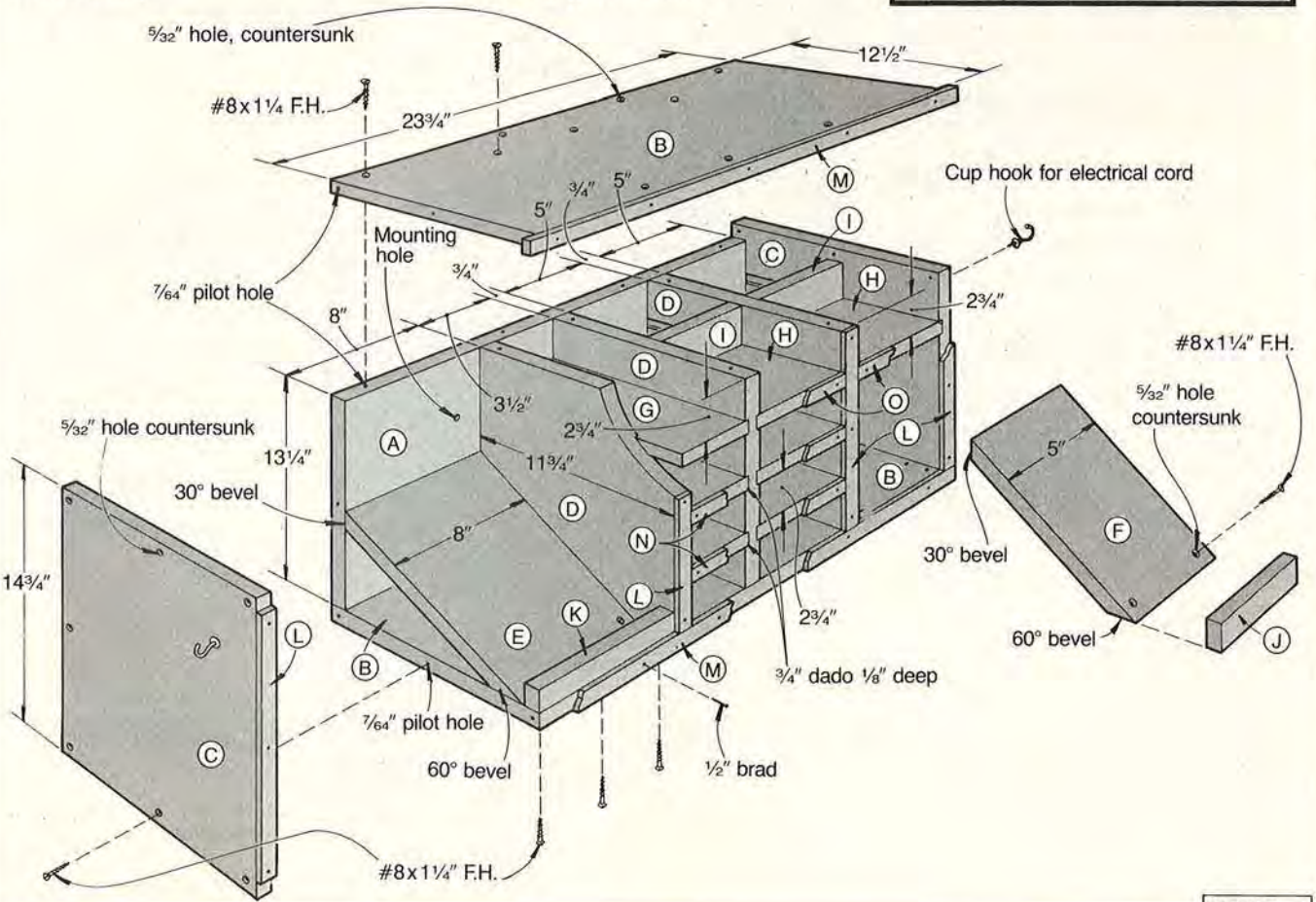
5 Glue and screw the top (B) on the cabinet. Sand all edges flush. Mask off the pine cleats, then paint all exposed surfaces to the desired color. Cut the pine trim strips (L, M, N, O) to finished size. Finish all the pine pieces with polyurethane or other clear finish. Attach the trim strips to the cabinet face. Attach cup hooks for electrical cords. Hang the cabinet.

Bill of Materials

Part	Finished Size T	W	L	Material	Qty.
A	¾"	13¼"	23¾"	particle-board	1
B	¾"	12½"	23¾"	"	2
C	¾"	12½"	14¾"	"	2
D	¾"	11¾"	13½"	"	3
E*	¾"	8"	12¾"	"	1
F*	¾"	5"	12¾"	"	1
G	¾"	3¾"	11¾"	"	3
H	¾"	5¼"	6¼"	"	4
I	¾"	2¾"	5"	"	5
J	¾"	1¼"	5"	pine	1
K	¾"	1¼"	8"	pine	1
L	¼"	¾"	13½"	pine	5
M	¼"	¾"	25¼"	pine	2
N	¼"	¾"	3½"	pine	3
O	¼"	¾"	5"	pine	4

*Cut these pieces oversize, then bevel cut to final lengths.

Supplies: #8x1¼" flathead wood screws, ½" brads, 2-1½" cup hooks, latex paint, wall anchors or screws for wall mounting



Continued

2 TIME-TRIMMING ROUTER ORGANIZER

When you want to use your router, you don't want to waste time routing through drawers and toolboxes for router bits, wrenches, and other accessories. This compact, wall-mounted organizer keeps everything you need, including your router, in plain sight.

1 Cut the mounting board to the finished size shown in the Bill of Materials. Lay the board on a flat surface, and position the accessories you want to hang on the board. The drawing *below* shows the dowel sizes and locations for typical accessories — wrenches, router edge guide, and one or more trammel bases for cutting circles. Once you've established locations for your accessories, drill ⅜"-deep holes in the board for the dowels and cut the dowels to length.

To make the 15° hole for the router dowel, use an adjustable drill guide, or make a 15°-angle drilling guide similar to the 30° guide shown on page 45.

2 Cut the ¾x¾" trim strips (B, C) to finished lengths. To make the bit organizer (D), cut two pieces of ¾" stock slightly oversize and laminate them together, face to face, with woodworker's glue. When the glue has dried, cut the piece to finished length and width, beveling the back edge to a 30° angle, where shown on the drawing *below*. Radius the front corners and rout a ¼" round-over on all edges *except* the back.

3 Lay out and drill shank holes in the bit organizer for your router bits. You may want to leave extra space on the bit organizer for future acquisitions. We made our bit organizer to hold 24 router bits of various sizes.

4 Paint the mounting board the desired color. After the paint dries, nail the trim strips to the edges of the board. Apply clear polyurethane or varnish to the pine trim pieces, dowels, and bit organizer. Glue the dowels into the board, and attach the cup hooks and bit organizer to the board.

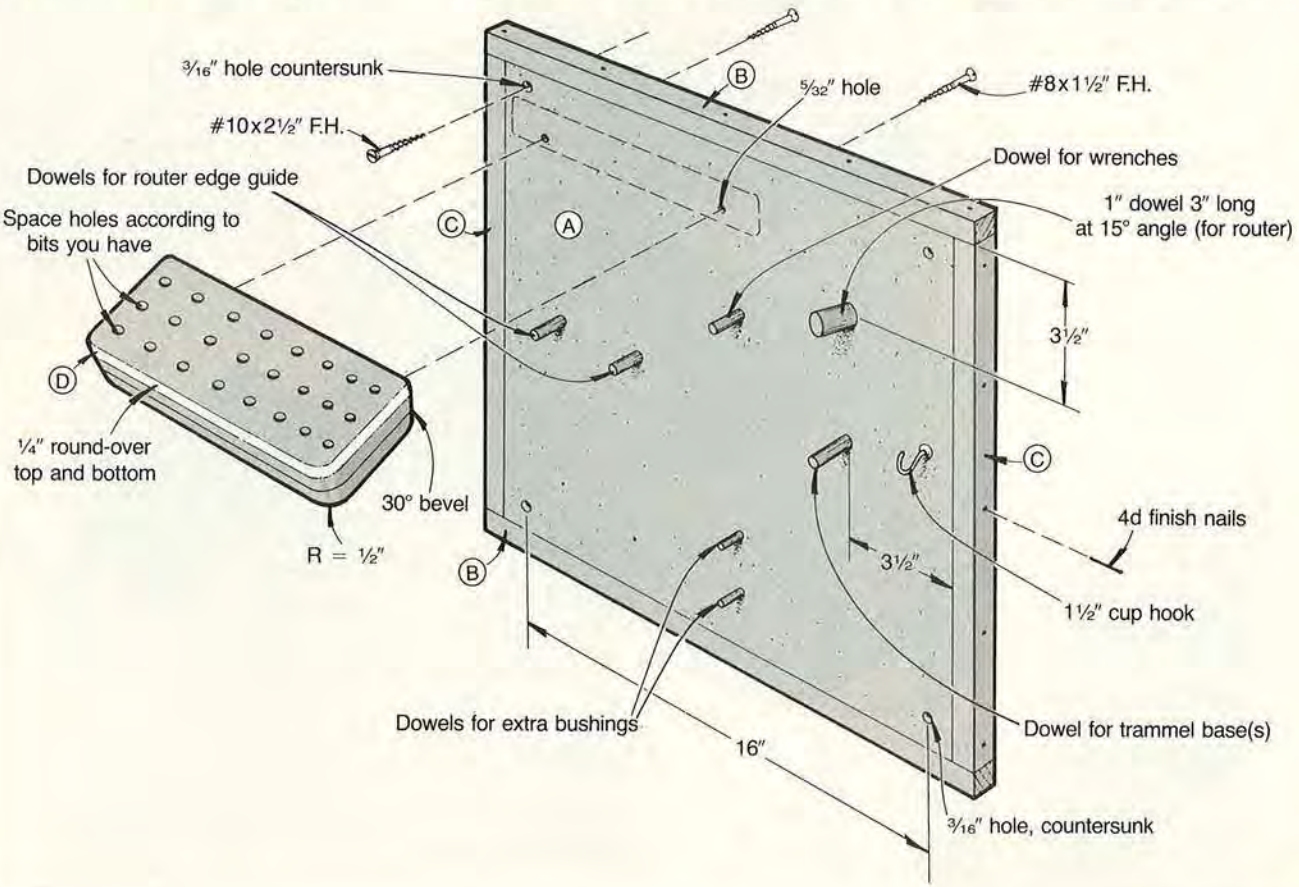
Finally, use screws to mount the board to the wall, making sure you align the board's mounting holes with the wall studs.

Bill of Materials

Part	Finished Size T	W	L	Material	Qty.
A	¾"	16"	18"	particle-board	1
B	¾"	¾"	19½"	pine	2
C	¾"	¾"	16"	pine	2
D	1½"*	5"	10"	pine	1

*Laminated from 2 pieces of ¾" pine

Supplies: 1½" cup hook, 3d finish nail, #10x2½" flathead wood screws, #8x1½" flathead wood screws, 1" dowel, ⅛" dowel, ¼" dowel



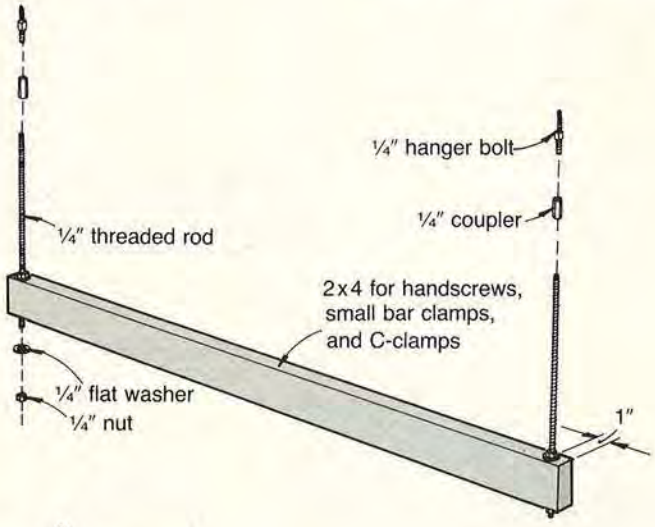
3 CLAMP-RACK COMBO

Where's the best place to hang your clamps? Right where you use them — at the clamping bench. The overhead rack easily holds several dozen small clamps of any type. You can hang your longer bar clamps and pipe clamps directly on the bench itself for convenient, easy access.

1 Cut the 2x4 for the overhead rack to the desired length (we cut ours slightly shorter than the length of the workbench). Then drill holes for the two ¼" threaded hanger rods where shown in the sketch. If you want to hang the rack crosswise to the joists, adjust the length of the 2x4 and/or rod-hole locations to correspond with joist spacing. Or, you can nail support blocks between the joists and suspend rods from them.

2 Use a hacksaw to cut the threaded rods to a length that will position the rack about 6" *lower* than the final anticipated height. Attach the threaded rods to the 2x4 rack, then to the ceiling joists, using the fasteners specified on the drawing.

3 Hang a few clamps on the rack, and then adjust the rack to a convenient height. We positioned our rack about 3½' above the table surface so taller projects, such as the stool in the photo on page 42, would fit underneath it. Cut off the rod ends extending beneath the 2x4.

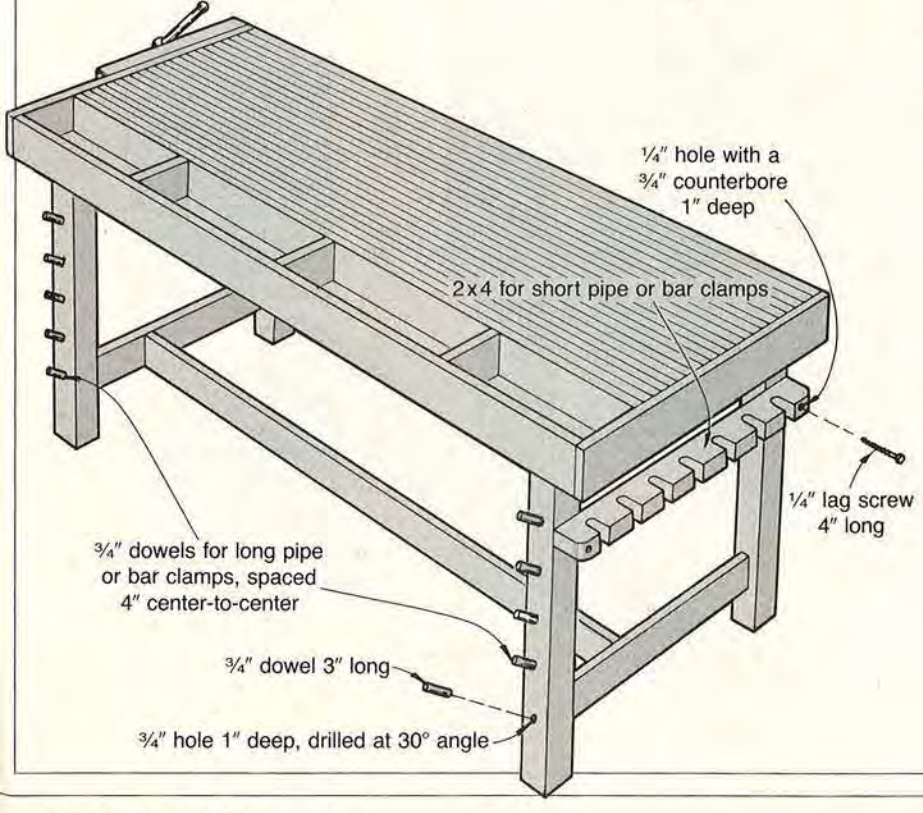


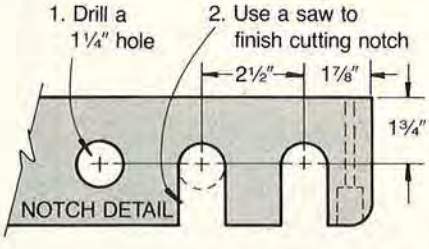
BENCH PEGS AND RACK

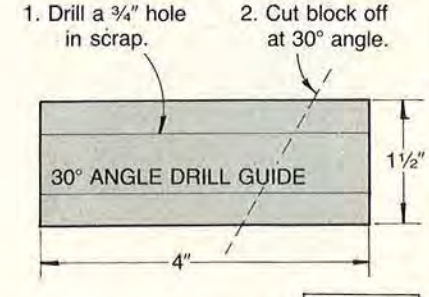
1 Drill the 30°-angled holes for the pegs, using an adjustable drill guide or the homemade drill guide shown on the drawing. Space holes 4" apart.

2 Cut 2x4 rack to the desired length. To make the notches, use a 1¼" hole saw or drill bit and cut the holes 2½" center to center; then complete cutout with a handsaw. Attach the rack to the bench where shown on the drawing.

Supplies: 2x4, ¼x4" lag screws (2), ¼" threaded rod, ¼" nuts and washers, ¼" hanger bolts, ¼" couplers, ¾" dowel.


¼" hole with a ¾" counterbore 1" deep
2x4 for short pipe or bar clamps
¼" lag screw 4" long
¾" dowels for long pipe or bar clamps, spaced 4" center-to-center
¾" dowel 3" long
¾" hole 1" deep, drilled at 30° angle





Continued

4 MAGNETIC TOOL BOARD

Your lathework will take a turn for the better when you can quickly grab needed tools and accessories from this convenient lathe-tool board.

1 Cut the mounting board (A), tool holder (B), magnet support (C), and slanted accessory holders (D) to size, bevel-ripping the front edge of C at 10° and the back edge of each D at 30°. Cut trim pieces (E, F) to size.

2 Drill ½"-deep holes in the tool holder ¼" larger in diameter than the butt of your lathe-tool handles. Next, drill ½"-deep holes in the accessory holders for your circular sanding attachments and live centers. Drill holes the same diameter as the shanks of your accessories. Radius the front corners of the tool holder and accessory holders, and rout a ¼" round-over along all edges *except* the back.

3 Paint the board the desired color and let dry. Then lay the board flat and position the tool holder, magnet support, and accessory holders. Now, position your turning accessories on the open area. Mark and drill dowel holes ⅜" deep to hang these items, and cut dowels to length.

4 Nail the trim pieces to the board. Apply polyurethane to all trim *except* the front edge of the magnet support. Affix the adhesive-backed magnetic strip to the front of the magnetic support. See the Buying Guide for our source of flexible magnetic strips.

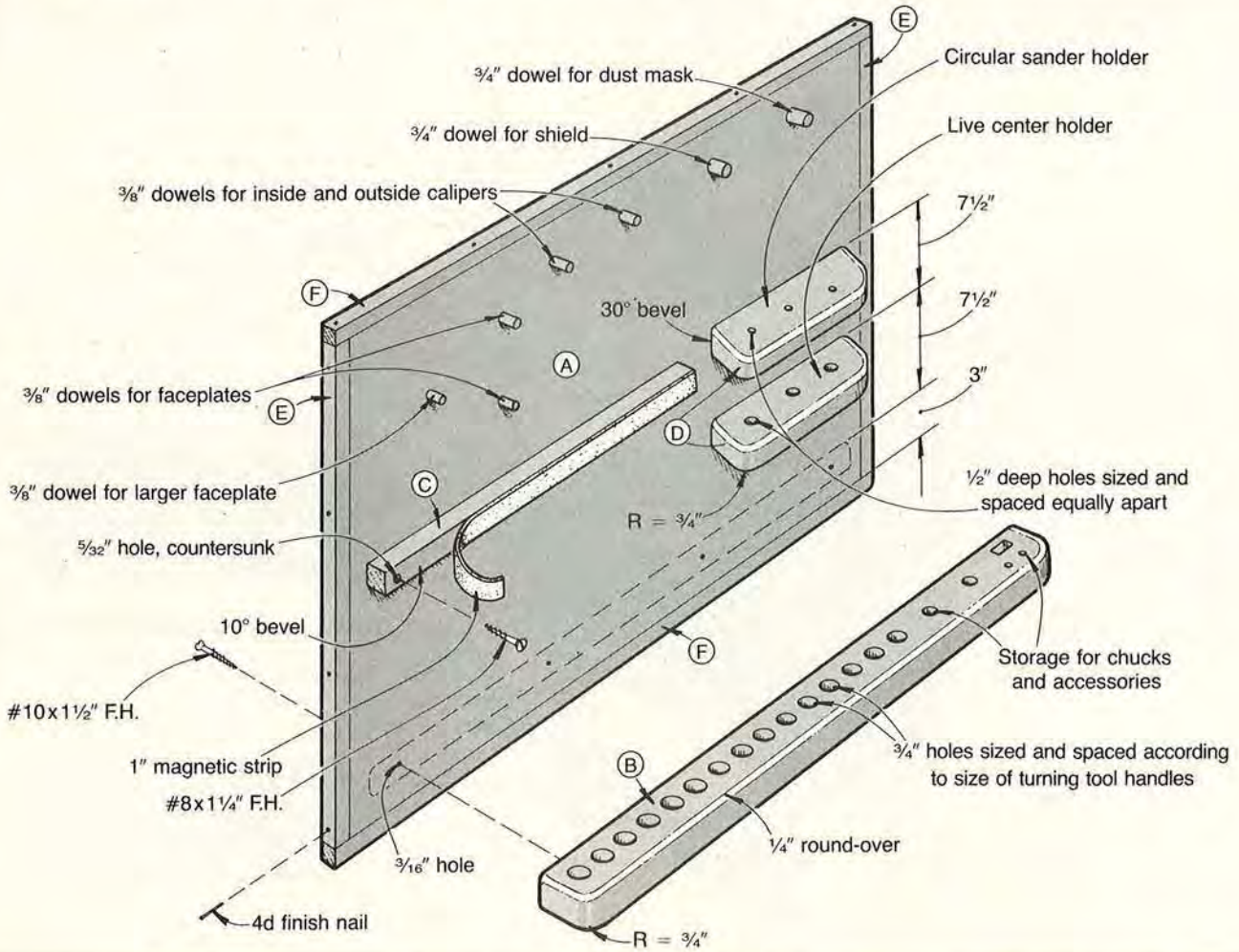
BUYING GUIDE

- Flexible magnetic strip. Adhesive-backed, catalog no. RD 236, $4.50 plus $2.50 for shipping, for 3 feet. Craft Supplies USA, 1644 South State St., Provo, UT 84601, or call 801/373-0917.

Bill of Materials

Part	Finished Size T	W	L	Material	Qty.
A	¾"	36"	48"	plywood	1
B	1½"	3"	46"	fir	1
C	¾"	1"	34¾"	fir	1
D	1½"	3"	6"	fir	2
E	¾"	¾"	36"	pine	2
F	¾"	¾"	49½"	pine	2

Supplies: #10x1½" flathead wood screws, ⅜" dowel stock, ¾" dowel stock, 4d finish nails, paint, polyurethane



5 "SWING-A-BIT" CABINET

This swing-out wall cabinet holds a surprising number of assorted drill bits and accessories. To make it, you first assemble the box, then rip-cut it into three separate sections.

1 Rip and crosscut a piece of ¾" pine to 6¾ x 52". From it, cut two pieces 7¾" long (A) and two pieces 17⅛" long (B). Rabbet the ends of the two longer pieces where shown on the Basic-Box drawing *below.*

2 Glue and clamp the top and bottom pieces (A) to the two side pieces (B) to form the frame. Now, cut the plywood sides (C), then attach them to the frame.

3 After the glue dries, use your table saw and rip fence to rip the frame into three sections to the widths shown in the drawing.

4 Cut shelves (D, E, F) to finished size. Drill holes in the shelves and sections 1 and 3 for drill bits.

5 Glue and nail the shelves to the frame sections where shown on the drawing. Attach the cleats (G) to the bottom of section 2. Connect the frame with hinges.

6 Cut two pieces of ¾" pine 1½ x 34", then laminate to form a piece 1½" thick. From this, cut the mounting bracket pieces H and I to finished size. Rabbet both ends of I and one end of H.

7 Assemble the bracket pieces with glue and reinforcing dowels, then radius the ends and corners. Drill holes in the bracket upright for wood screws or wall anchors.

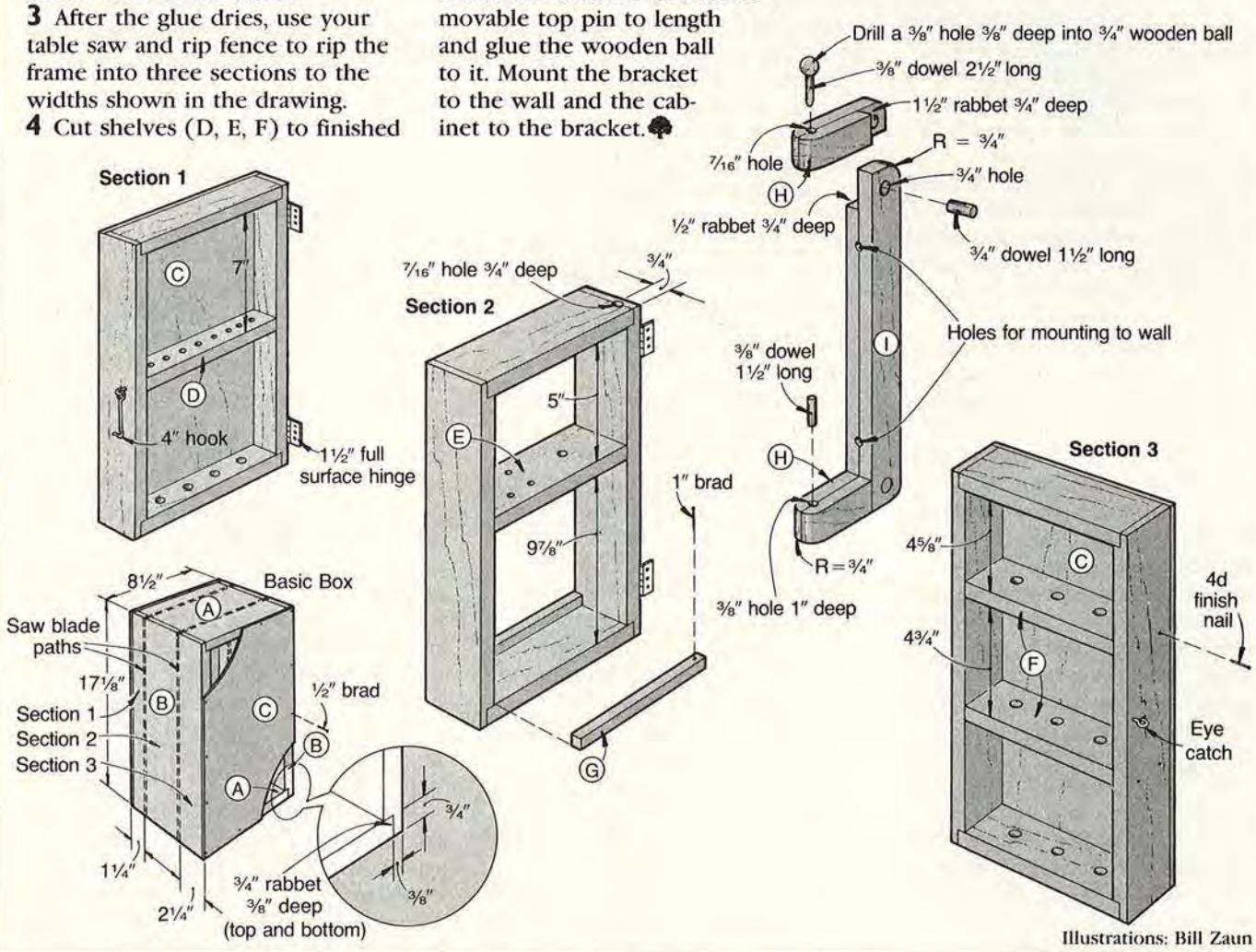
8 Drill pivot holes in the mounting bracket and in Section 2 for the dowel pivot pins. Cut the bottom pivot pin to length and glue it into the bracket. Cut the removable top pin to length and glue the wooden ball to it. Mount the bracket to the wall and the cabinet to the bracket.

Bill of Materials

Part	Finished Size T	W	L	Material	Qty.
A	¾"	6¾"	7¾"	pine	2
B	¾"	6¾"	17⅛"	pine	2
C	⅛"	8½"	17⅛"	plywood	2
D	¾"	1⅛"	7"	pine	1
E	¾"	3¼"	7"	pine	1
F	¾"	2⅛"	7"	pine	2
G	⅜"	⅜"	7"	pine	2
H*	1½"	1½"	6¼"	pine (laminated)	2
I*	1½"	1½"	20⅝"	pine	1

*Laminated from two ¾" pieces

Supplies: ½" brads and 4d finish nails, ⅜" dowel, ¾" wooden ball, 2 pairs of 1½" full-surface hinges, screws for mounting to wall, 4" hook-and-eye latch, polyurethane



Illustrations: Bill Zaun

ANILINE

MIX-IT-YOURSELF MAGIC FOR NATURAL-LOOKING

Just another stain you say? No way! Aniline dyes mix like Kool-Aid, give you clear, deep color that lets the grain show through, and can put savings in your pocket compared to the popular premixed pigmented stains.

How can you color wood for a super look without muddying up the grain? Do as the pros do — try a water soluble aniline dye on your next project. Here's the difference: Pigmented stains coat the wood with color. The minute, finely ground pigment particles bond to the wood after the carrier (oil, turpentine, solvent, or water) evaporates. All those microscopic pigment bits simply cover up the wood.

On the other hand, aniline dyes completely dissolve — like food coloring — and saturate the wood fibers. The color ends up in the wood, not on it! You see all the grain, like never before.

Perhaps best of all, even amateurs can get professional results the first time. And, anilines are now available from a number of sources (see our list at the end of this article).

Choose colors from a rainbow

Aniline dyes come in powder form, and in three distinct types: water soluble, alcohol soluble, and oil soluble. While eventually you may want to try them all, start with the water soluble kind. They're easiest to mix (and there's no obnoxious fumes), practically foolproof to use, inexpensive, and come in a rainbow of colors.

Because of the nearly unlimited mixes possible, aniline dyes have been, and continue to be widely used by professional wood finishers. With six or seven basic colors, a pro can mix and match any wood tone — even peacock blue, if he wants to. In water soluble anilines you may choose from over 75 basic colors of powder, and with these you can mix hundreds.

But that doesn't mean you have to mix different colored powders to arrive at the exact hue you want. To make it easier for you, manufacturers now sell aniline dye powders premixed in wood tones such as Honduras Brown Mahogany, Dark Brown Walnut, or Early American Maple. Of course, you can vary their intensity by adding more water, or change them a bit by tinting with another color.

Because anilines are inexpensive, you can afford to experiment. One ounce of aniline powder will cost you from $2.50 to $4.50, depending on color, and makes a *quart* of dye! Buy four ounces for around $10 and you'll get a gallon. For $16 you can purchase eight ounces to make two gallons.

You'll have few problems with anilines

Water soluble anilines sometimes get rapped for "raising the grain." And it's true. The water you mix the powder with will cause little hairs of wood fiber to stick up after the dye has dried, requiring some sanding. But, for a really glass-smooth finish, some woodworkers do this sanding anyway, usually after wiping the wood down with water in a prestaining step. Do the same thing and you won't have fuzzy hairs sticking up after you dye the wood.

You might also hear the term "light-fastness" regarding anilines. This refers to the dye's resistance to fading. For all practical purposes, don't worry about it if your project will only be used indoors.

Anilines should only be used on indoor projects. If used on outdoor items, the sun will fade their color. But indoors, a water soluble aniline will remain *light-fast* and hold its color for the life of the project.

You also don't have to worry about the color of a water soluble aniline "bleeding" through a clear finish coat. As long as you let the wood dry thoroughly, you can coat it with any finish you choose — from oil to lacquer.

What about safety? Since all anilines come from coal tars through a chemical manufacturing process, use them with common-sense cautions. Don't breathe clouds of the powder, and certainly don't swallow any of the mix. But, at least with the water soluble kind, there's no need to wear protective gloves or a mask.

How to mix and use water soluble anilines

If you have mixed Kool-Aid without a hitch, you'll do fine with water-soluble anilines. You need a mixing container, a storage jar, a measuring spoon, a stir stick, and a filter.

To mix a quart of dye, heat up a quart of water to hot (not boiling) temperature. Measure out one ounce of powder for a reasonably concentrated dye (some colors may require a bit more). Then, pour the water into your mixing container and gradually stir in the dye. After dissolving the powder, strain the dye mixture through a filter (a paper coffee filter works perfectly) into a ceramic, plastic, or glass container, such as a canning jar, that you can seal tightly with a lid.

Before dyeing your project, test the color on a scrap of the same wood. Apply with a brush, clean cloth, or sponge. If it's a little dark, add water to the mix. If it's too light, wait until the wood dries,

DYES

WOOD TONES

Measure and mix. **A tablespoon of aniline powder makes a quart of dye.**

Pour off and strain. **A paper filter traps any unmixed powder in the dye solution.**

then put on another coat. Or, you can strengthen the mix with some more powder (but reheat the mix before you add powder). When you find a combination that works, note how you arrived at it on a piece of paper — you may want to duplicate the look later.

When you've finished dyeing, cap the dye solution and store it with your other finishing supplies. Kept from freezing, it'll last for years, suffering only from some possible crystallization you cure by reheating the mix. Unmixed, aniline powder stores indefinitely.

Tips from a pro on dyeing wood

We asked John Moser, president of Wood Finishing Supply Co., Inc., Macedon, New York, for some helpful tips for first-timers on using water soluble anilines. John not only sells the largest selection of aniline dyes we know of, he's also a professional wood finisher with years of experience using nothing but them. Here's what he says:

- ***On basic colors for mixing.*** "Pros mix all the colors they need from six or seven basic ones. If you want to mix, and it can be fun, buy these five: medium red mahogany, moss green, black, golden oak, and brown walnut. With these, you can match most cabinet woods. Be sure, though, to only mix dissolved colors. Don't try mixing the powders."
- ***Getting rid of raised grain.*** "Many pros dye the wood first, let it dry completely, then give it a light coat of shellac. It stiffens the hairs so you can sand them off with 220-grit paper for a super-smooth finish."
- ***Putting on a second coat.*** "Always let the wood dry 24 hours after dyeing. If you apply a second coat when the wood is still wet, it won't have an effect."
- ***Avoiding lap marks.*** "With water solubles, as long as you keep a 'live edge' of wet dye you won't get them."
- ***Checking color.*** "Always go by the wet color of the dye on the wood. As it dries it lightens, but it will come back when you apply the finish."
- ***Dyeing softwoods.*** "They won't spread evenly on softwood unless you 'size' it first with a mixture of ¼ cup hide glue to one gallon of water. Sand the wood after it dries, and before dyeing."
- ***Using fillers and dyes.*** "Dye open-grain wood first, then seal it with sanding sealer or shellac sealer before filling. This makes a pleasing light/dark contrast. If you fill first, then dye, the filler gets real dark."

WHERE TO BUY ANILINE DYES

- ***Albert Constantine and Son, Inc.,*** Dept. W, 250 Eastchester Rd., Bronx, NY 10461-2297. 1-800/223-8087.
- ***Garret Wade Company, Inc.,*** Dept. W, 161 Ave. of the Americas, New York, NY 10013. 1-800/221-2942.
- ***Highland Hardware,*** Dept. W, 1045 N. Highland Ave., NE, Atlanta, GA 30306. 404/872-4466.
- ***Lee Valley Tools Ltd.,*** Dept. W, P.O. Box 6295, Station J, Ottawa, Ontario K2A 1T4, Canada. 613/596-0350, 416/746-0850 (Toronto).
- ***The Woodworkers' Store.*** Dept. W, 21801 Industrial Blvd., Rogers, MN 55374-9514. 612/428-2199.
- ***Woodcraft Supply Corp.,*** Dept. W, 41 Atlantic Ave., Box 4000, Woburn, MA 01888. 1-800/225-1153.
- ***Wood Finishing Supply Co., Inc.*** Dept. W, 1267 Mary Dr., Macedon, NY 14502. 315/986-4517.

Written by Peter J. Stephano
Photographs: Bob Calmer

Print this article

WOODWORKERS' GUIDE TO CLASSIC FURNITURE

Four Styles From America's Golden Age

Graceful lines and crafted detail give some furniture the lasting beauty that makes it classic. In America's early days, colonial craftsmen designed few such pieces. Most people made do with simpler, more rustic furnishings. The fancy, fashionable furniture being created was based on styles popular in England at the time — styles often bearing the names of reigning monarchs.

By the early 1700s times became more prosperous in the colonies, and our craftsmen began interpreting English-designed furniture rather than copying it. These alterations became truly American, and elements from this Golden Age still grace furniture made today.

Written with David Donnelly **Illustrations: Bill Zaun**
Photographs: Courtesy of Metropolitan Museum of Art, New York; H. F. du Pont Winterthur Museum, Winterthur, Delaware.

William and Mary

Pilgrims brought rugged, uncomfortable furniture to the New World. Their somberness no doubt turned to smiles when the lighter and softer William and Mary style became popular.

Namesakes for this style were William III (William of Orange) and Mary II (Mary Stuart, daughter of James II), crowned King and Queen of England in 1689. They favored furniture from Holland, where they had lived, and inspired a new trend.

Colonists, after years of struggle, could now think of comfort in the New World and cheerfully adopted the more graceful-looking new style. Even by today's standards, what they saw in William and Mary furniture can be considered attractive.

Fashionable pieces displayed decorative inlay, veneering, gilding, and japanning (painted pictures on furniture). There were new pieces, too: various forms of desks, secretaries, butterfly tables (distinctly American), and

Queen Anne

This furniture style didn't reach American shores until Queen Anne of England (1702-1714) had passed on. Fashions changed a lot slower then than they do today!

In the early part of the 18th century, a growing appreciation for music, art, literature, and philosophy led to a richer treatment of furniture. And at the same time, a developing wealthy class of colonial merchants, shipowners, and planters were patronizing an increasing number of furniture and cabinetmakers who promised to deliver the latest fashions. As geographically diverse as the Colonies were, it's not surprising that regional differences also led to varying designs of popular furniture.

Queen Anne furniture softened with curves the light yet rigid and formal lines of the William and Mary style. The S scroll, or *cyma* curve reappears over and over in pieces of this period, reaching its highest expression in the cabriole leg. The same curve appears

1689–1720 The beginnings of fashionable comfort

upholstered wing chairs. The most significant were two types of chests — the lowboy and the highboy, or "high chest".

You can always recognize a piece of William and Mary furniture by one telltale design aspect — the turned leg. Craftsmen gave turned legs a taper referred to as *trumpet-turned* because of the resemblance to a trumpet, and you'll see them in many variations.

Compared to later periods, the adaptation of the William and Mary style in the Colonies brought forth no individual cabinetmakers to earn historical distinction. What records exist indicate that most cabinetmakers at work then were of English background, and for their furniture, they preferred the walnut they were accustomed to using across the ocean.

Right. **Carved, fluted, or ruffled ornamentation on edges was called gadrooning.**

Center. **An inverted cup design also appeared on turned legs.**

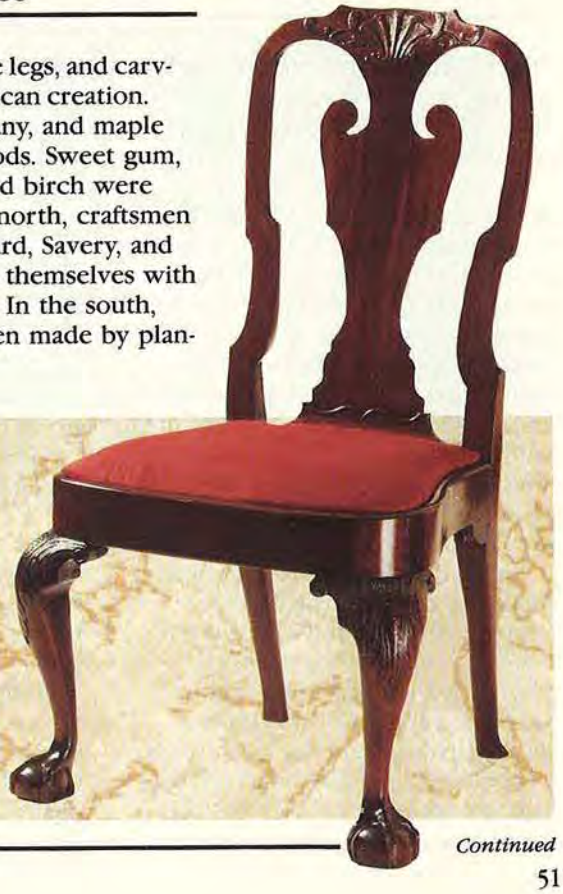
Far right. **William and Mary japanned highboy with trumpet-turned legs, circa 1700. Made of maple and white pine, and painted with Oriental designs.**

1720–1755 Furniture the good queen never lived to see

in carved shell and leaf patterns, chair backs, and desk and table skirts. Add to the curves the carved sunburst, leaves, rosettes, and claw feet and you have a wealth of detail.

Few furniture pieces were appreciated as much as the new four-post beds — a prize to snuggle in during long, cold winter nights. Highboys remained popular, and the Queen Anne variety with pediments, finials, cabriole legs, and carvings, was a uniquely American creation.

Walnut, cherry, mahogany, and maple were favored cabinet woods. Sweet gum, tulipwood, white pine, and birch were secondary woods. In the north, craftsmen such as Townsend, Goddard, Savery, and Johnston made names for themselves with their designs and skills. In the south, furniture was often made by plantation slaves.



Right. **A typical Queen Anne floral carving. Introduction of easy-to-work mahogany made such detail possible.**

Center. **The cabriole leg expresses the pleasing soft line of a cyma curve.**

Far right. **A Queen Anne side chair with a vase-shaped back, shell motifs, cabriole legs, and claw feet. Made of cherry, circa 1757.**

Continued

Chippendale 1755–1790 Furniture that made the designer famous

Thomas Chippendale, a London cabinetmaker, combined elements from Gothic, Chinese, and French designs for a unique style so popular it was given his name.

Although war between England and the Colonies was becoming inevitable by the mid-1700s, Americans had a spirit of confidence. Those of wealth displayed it in their fine homes filled with furniture built in the then-currently celebrated Chippendale style.

Even Americans had heard of the craftsman's book entitled *The Gentleman and Cabinetmaker's Director,* and as the English did, acclaimed Chippendale the foremost designer of the period. Yet in their shops, American furniture makers created pieces quite different.

English Chippendale displayed flamboyant curving lines, called *rococo*, and shapes of shell, plant, animal, and tablet forms. Chair backs, or splats, were done in pierced arches or with much Chinese-influenced lattice and fretwork. There were also ruffles, tassels, and vase shapes. The best-known Chippendale characteristic remains the top rail of a chair in a "cupid's-bow" shape.

Truly American creations include the dropleaf Pembroke table and breakfront bookcase. Throughout the Colonies, master craftsmen developed regional favorites. Highboys were uniquely refined in Philadelphia, featuring elaborate rococo carving and pierced finials.

In Rhode Island, the well-established Goddard and Townsend originated a blockfront Chippendale style they incorporated into chests, bureaus, desks, secretaries, and dressers. It was massive, square, and impressive, and has been called the finest example of American furniture.

Mahogany had been around since the beginning of the century, but it

Left. **Shell motifs, especially in Newport blockfronts, became an element of what has come to be called American Chippendale.**

Right. **Chippendale side chair back with cupid's-bow top rail, gothic arch, vase-shaped splat, and rococo carving.**

Far right. **Chippendale period Newport kneehole bureau, one of the many variations of blockfronts that originated in America. This example has ogee bracket feet, often found on case pieces. Made of mahogany, circa 1765-1775.**

Federal 1790–1830 Greek and Roman history revived

Federal furniture, rather than a unique style, represents several styles that evolved during the founding of the new republic.

Immediately after the Constitution was adopted in 1788, there came another revolution of sorts. People became receptive to new ideas and designs in their style of living. Once-cherished Chippendale furniture was now viewed as vulgar and massive. Excavations at Pompeii and Herculaneum in 1749 produced Greek and Roman artifacts that stirred an interest in classic forms both here and in Europe.

Federal describes the American influence on the design ideas brought to the brand-new United States by immigrating craftsmen such as France's Charles-Honore Lannuier and Scotland's Duncan Phyfe. It was a time for fresh ideas.

In general, Federal furniture was lighter and more delicate than its predecessors. Slender, tapered legs replaced cabriole legs. Veneers and inlaid patterns of light wood, such as satinwood, were used with dark wood for contrast. The American symbol of the eagle could be found everywhere — carved, inlaid, or bronzed.

The findings from ancient Greece and the Roman empire initiated a classical revival, and each of the most popular styles in the Federal period were influenced by it:

Hepplewhite, named after George Hepplewhite, an English cabinetmaker, featured delicate, curved lines and inlay. Shield-back chairs with carved urns and drapery swags remain his best known works.

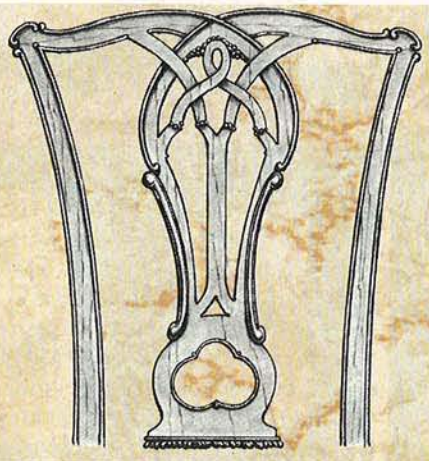
Sheraton furniture was the work of another Englishman, Thomas Sheraton. It had simple, straight lines with decorations such as reeded chair legs, veneer, gilt, and beautifully inlaid eagles, ovals, shells, and rosettes.

Left. **Typical eagle inlay of the Federal period in America.**

Right. **A carved chair splat displaying the tassel and drapery form used in Hepplewhite furniture. Urns, fans, discs, and ovals were also popular.**

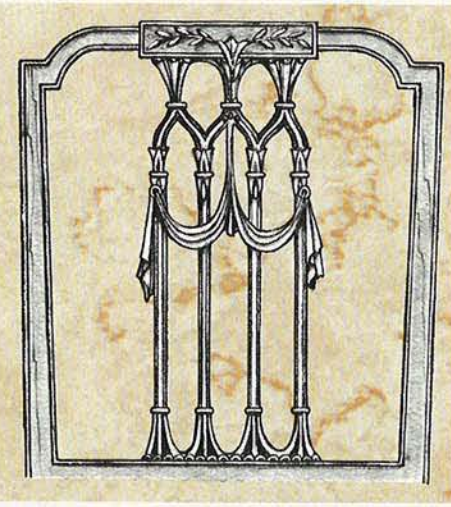
Far right. **Federal period Hepplewhite tambour desk with inlaid husks, stringing to outline the tapered legs, and sliding tambours. Brass ornamentation was simple, but elegant. Made of mahogany with drawer fronts of figured satinwood veneer, circa 1795-1800.**

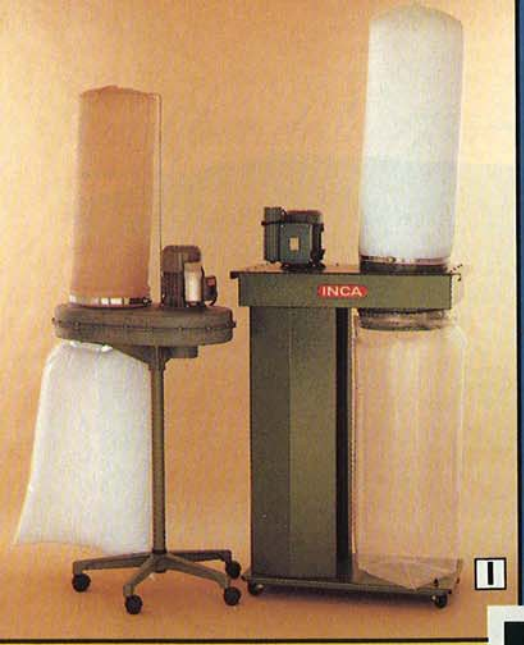
wasn't until it was used in Chippendale furniture that it became recognized by English craftsmen as the premier cabinet wood. For crisp carving, mahogany was unequalled. Walnut, maple, cherry and other fruit woods, along with mahogany, were widely used by cabinetmakers in America. Figured maple became particularly treasured, often used for inlays and other decorative effects.



Empire, militaristic and majestic, was inspired by Paris and Napolean rather than London. It featured bronze gilt, marble surfaces, winged animals, and military motifs.

Sectional dining tables, tambour desks, sideboards, and card tables made their appearance. Mahogany was still favored, along with inlays of some exotic woods.





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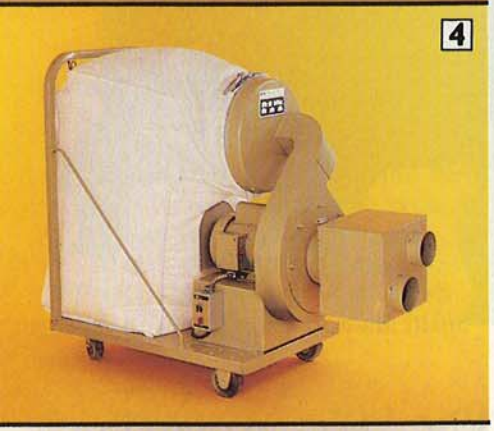

PORTABLE DUST COLLECTORS

These machines eat sawdust as fast as you can make it.

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Sawdust, sawdust, everywhere! It piles up on the floor and finds its way into every nook and cranny in your shop. Tired of fighting this perpetual menace — and losing? A portable dust collector may be just the weapon you need. We checked out 12 of these dust-busters to find out just how well they fit into the home shop.

WHAT A DUST COLLECTOR CAN DO FOR YOU

Portable dust collectors remove sawdust, chips, and shavings directly from your woodworking machines — while you're working. That puts an end to sweeping or vacuuming the mess left by the machines after you're through using them. For example, look at the difference one of these collectors made on our thickness planer in the photos *at right.* Dust collectors also trap the large volumes of fine sawdust created by such machines as sanders, so you don't have to breathe all that stuff while you're working with them.

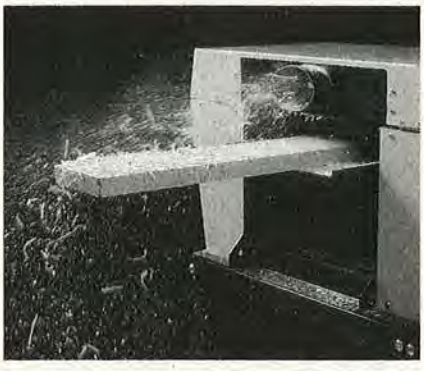
Before the advent of portable dust collectors, you had only two options for removing dust directly from your machines: connect them to a shop vacuum, or install a permanent dust-collection system.

Shop vacuums work reasonably well on band saws and other machines that produce relatively small amounts of sawdust. But they won't handle machines that produce mountains of dust, chips, or shavings — they just don't have the suction or storage capacity.

Permanent dust-control systems use a stationary cabinet-type collector connected by ductwork to the various machines. They'll do the same job as a portable dust collector, but they have several drawbacks in the home shop. First, they're expensive — about $1,500 to have a modest system installed. Compare this to the prices of the portable collectors in the chart on page 59.

Secondly, a permanent system fixes the locations of your machines. So you'll have to rework the duct system every time you want to relocate a machine or add a new one. And if you want to add more machines or ductwork to the system, you may even have to replace the collector with a larger one.

For its purpose, a portable dust collector combines the best features of both a shop vacuum and a permanent dust collection system. It has more suction and storage capacity than a shop vacuum. And you can move it from machine to machine, regardless of number or location. Or, if you don't like the idea of constantly switching over, you can buy a large portable unit, such as the Grizzley, Sunhill, or Kraemer. These will service two or three pieces of equipment running at once.



A "plane" advantage. Thickness planers and jointers spit out more heavy chips and wood shavings than any other woodworking machine. The right-size dust collector will bag 95% of the stuff. Here we have the Inca collector connected to our 13" Foley-Belsaw planer.

Photos to left

We Tried These 12:

1. **Elektra Beckum Model SPA1000, Inca Model 101K01.01**
2. **Woodmaster**
3. **Total Shop Model TS 110 Jet Model DC 610**
4. **Kraemer Model S-1**
5. **Grizzley Model G1030**
6. **Foley-Belsaw Model 3340902 Delta Model 50-180**
7. **Dust King Model 750-2**
8. **Sunhill Model UFO 101**
9. **Shopsmith Model DC 3300**

HOW DUST COLLECTORS WORK: THE INSIDE SCOOP

Contrary to what you may think, portable dust collectors are not just oversize shop vacuums. By design, a dust collector moves a large volume of air through a large-diameter hose (typically 4", 5", or 6"). The suction capacity (volume of air moved) of the collectors we reviewed ranges from about 350 to 1,850 cubic feet per minute (CFM). By comparison, a shop vacuum moves a relatively small volume of air (80 to 150 CFM) through a small diameter (1¼" to 2½") hose. So, dust collectors can move large amounts of sawdust, chips, and shavings that would clog up a shop vacuum.

To accomplish this feat, dust collectors use much larger blowers (impeller and housing) than a vacuum. To drive these larger blowers, dust collectors use continuous-duty induction motors ranging from ½ hp to 3 hp. Also, these motors will operate for long periods of time without burning up. To facilitate a higher airflow capacity, dust collectors use large external filter bags.

By contrast, a shop vacuum uses a small, brush-type universal motor to operate a small blower at a high speed. This enables a vacuum to move air at a much higher velocity than a dust collector. Thus, you

Continued

will find vacuums more efficient in picking up small amounts of material spread over a wide area. In fact, they often work better than a dust collector on machines that produce relatively small amounts of fine sawdust, such as band saws and jigsaws. But they're not designed to run for extended periods. Also, their relatively small waste containers limit the amount of material they can hold.

Dust collectors rely on a cyclonic airflow principle for increased suction capacity. The sketch on page 57 shows the differences between a shop vacuum, a single-stage dust collector, and a two-stage dust collector.

Single-Stage Or Two-Stage Collectors: Which One For You?

The two-stage collectors we looked at include the Delta, Dust King, and Foley-Belsaw. The rest are single-stage collectors. As you can see in the sketch *at right,* the blower (impeller and housing) on a two-stage collector pulls heavy chips and shavings into the waste barrel (the first stage). In the second stage, fine sawdust passes through the blower and into a filter bag. On a single-stage collector, all material passes through the blower before entering the waste container and filter bag.

Because of this design difference, there's less wear and tear on the impeller (fan) of a two-stage collector. This advantage becomes important if you frequently use the collector on machines that produce lots of heavy chips, such as a thickness planer or jointer.

Aside from a longer blower life, two-stage collectors have a safety feature that many single-stage collectors don't. On some single-stage collectors, the pickup hose connects directly to the blower inlet. Removing the hose exposes the impeller. If the hose disconnects while you're running the collector, you could catch your finger, clothes, or a tool in the impeller. This potential increases on units with blower inlets that face upward. If the hose does come off, we suggest you don't try to reconnect it with the machine on.

On two-stage collectors, the blower inlet attaches to the waste-container lid, so the impeller isn't exposed (see sketch). But this same design has a major disadvantage: You have to lift off the entire assembly each time you empty the barrel. On the Delta, for instance, the lid and blower assembly weigh about 65 pounds. We found it much less of a hassle to empty the waste bags on the single-stage collectors.

See page 58 for more on good waste container design.

CAN YOU ADAPT YOUR TOOLS FOR DUST COLLECTION?

You can connect a dust collector to most stationary woodworking machines: thickness planers, jointers, molders, shapers, stationary sanders, table saws, radial arm saws, and band saws, to name the most common ones. With some ingenuity, you could even hook one up to a drill press or lathe.

If you have newer machines, chances are good that they already have a collection chute, port, or hood to which you can attach a portable dust collector. If they don't, most tool manufacturers offer these accessories for at least some of their newer machines.

They may also sell adapter fittings to fit various standard hose sizes, including the 4" flexible hose used by most dust collectors.

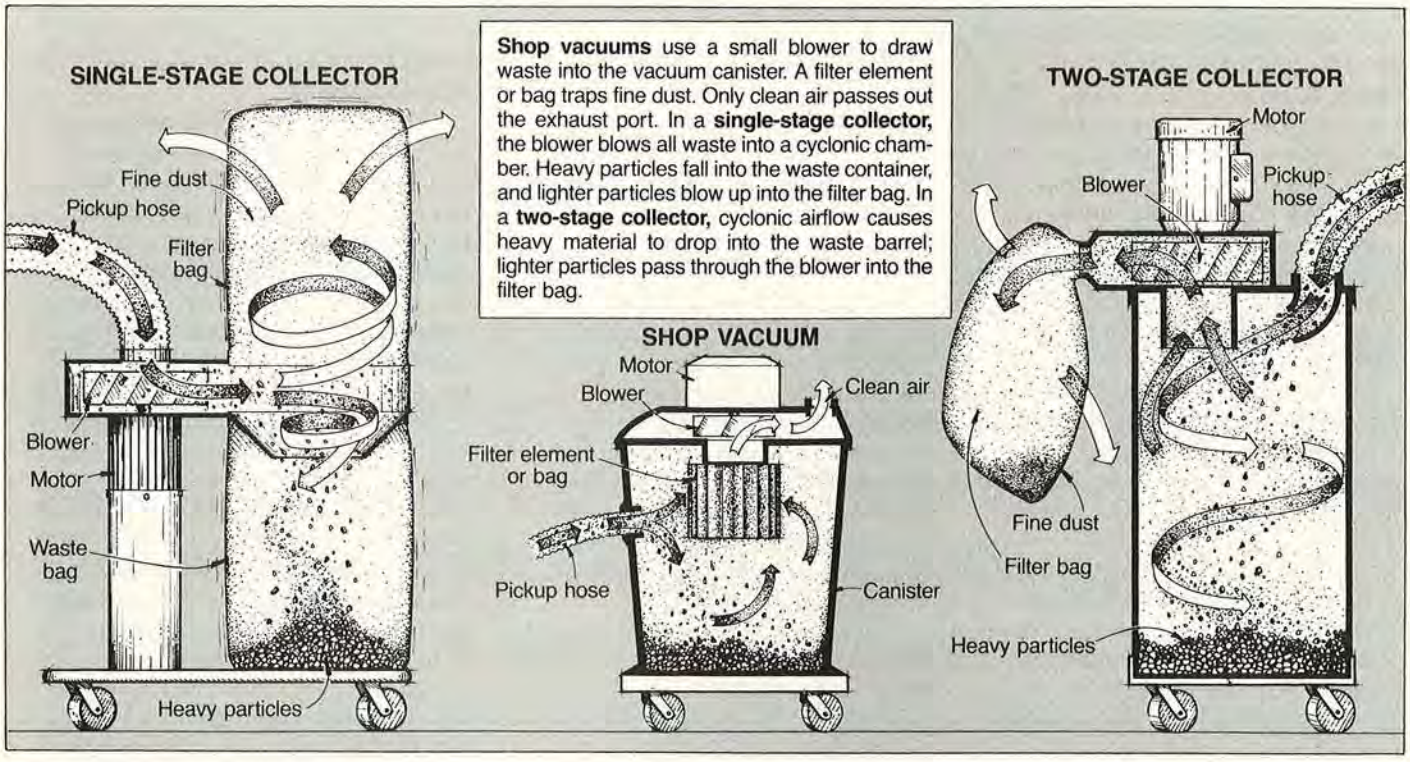
Also, you'll find that many older machines (and some newer ones) have dust chutes or ports that fit shop vacuums. With these, you'll need an adapter to accommodate the larger-diameter hose sizes used with dust collectors.

But how do you connect a dust collector to a machine with no provision for one? You'll have to improvise. We suggest you contact the tool manufacturer for advice. If they can't sell you the required fittings, maybe one of their technical people can tell you what you'll need and how to install it.

If you can't get a standard manufactured fitting, you can probably get a local sheet metal shop to fabricate one for you. Or, check with a heating and air-conditioning supplier. They may have a prefabricated fitting that you can adapt to fit your machine. They also carry a wide variety of standard fittings for installing permanent ductwork.

Some manufacturers have designed their collectors to complement their tools. For example, the Shopsmith collector pictured *at right* comes with a multi-hose fitting and two 2½" hoses to fit Shopsmith equipment. But it also has an adapter for a standard 4" hose. You'll find certain conveniences by sticking with the same company for your tools and dust collector. Not only will connections match, but manufacturers tend to match suction capacity, as well. For example, Delta gives recommendations on which of their collectors to use for various Delta woodworking machines.

The Shopsmith collector uses three 2½"-diameter hoses to fit Shopsmith woodworking machines. In this photo, we've connected two of them to the collector. To add a third, you remove the plastic plug at right. Standard features include an adapter for a 4" hose, and attachments.


SINGLE-STAGE COLLECTOR
Fine dust
Pickup hose
Filter bag
Blower
Motor
Waste bag
Heavy particles
Shop vacuums use a small blower to draw waste into the vacuum canister. A filter element or bag traps fine dust. Only clean air passes out the exhaust port. In a single-stage collector, the blower blows all waste into a cyclonic chamber. Heavy particles fall into the waste container, and lighter particles blow up into the filter bag. In a two-stage collector, cyclonic airflow causes heavy material to drop into the waste barrel; lighter particles pass through the blower into the filter bag.
SHOP VACUUM
Motor
Blower
Clean air
Filter element or bag
Pickup hose
Canister
TWO-STAGE COLLECTOR
Motor
Blower
Pickup hose
Fine dust
Filter bag
Heavy particles

OUR SIZING RECOMMENDATIONS

We've based our CFM requirements for the following machines on figures provided by several dust collector manufacturers. These figures assume a minimum velocity (air speed) of 4,500 FPM, at a static pressure of between 3″ and 4″.

TOOL	CFM
Band Saws	300-450
Belt Sanders	
up to 6″	400-500
7″-9″	750
Disc Sanders	
up to 12″	400
13″ to 18″	650
Drum Sanders	
up to 200 sq. in.	300-400
Jointers	
up to 6″	400
7″ to 12″	700
Thickness Planers	
up to 13″	500-700
14″ to 20″	800-1,100
Radial Arm Saws	
up to 10″	300-400
12″ to 14″	600
Table Saws	
up to 10″	400
12″ to 14″	600

Note: Lathes have high CFM requirements relative to the amounts of shavings and sawdust they produce. So, we consider dust collectors impractical for attaching to lathes in the home shop.

SUCTION POWER: HOW MUCH DO YOU NEED?

We suggest you size your collector to handle your largest machine, with a bit of power to spare, in case you decide to buy an even larger machine later.

Suction power, or airflow capacity is measured in cubic feet per minute (CFM). The chart *at left* shows the CFM requirements of some typical machines.

Unfortunately, you can't directly compare the power of one dust collector against another by using the manufacturer's CFM ratings. Why? Because several factors affect airflow capacity, and the manufacturers don't test their machines under the same conditions.

To get an accurate picture of a collector's capacity, you have to know what *static pressure* (airflow resistance) the manufacturer used to take the CFM rating.

Here's how static pressure relates to dust collectors: As static pressure increases, CFM decreases. For example, a dust collector may pull 750 CFM at 1″ static pressure, but only 500 CFM at 4″ static pressure. On a dust collector, when you decrease the hose diameter, increase hose length, or otherwise restrict airflow, you increase static pressure. Also, collectors with small filter bags generally operate at higher static pressures than ones with large filter bags.

On most dust collectors, the blower itself operates at about 1″ static pressure (called *internal static pressure*). You add *external static pressure* when you connect the dust collector to a woodworking machine. For example, most dust collectors operate at between 3″ and 4″ *total static pressure* (internal plus external static pressure) when connected with about 5′ of 4″ hose to a machine.

We use static pressure range of 3″ to 4″ for the CFM figures in the machine-sizing chart. To help you choose the right-size dust collector, compare our recommendations against the manufacturer's CFM ratings in the chart on page 59. If two collectors have the same CFM rating, the one with the higher static pressure rating will have the higher capacity.

Continued

OTHER POINTS TO CONSIDER

What You Should Know About Motors

You can determine a dust collector's efficiency by comparing motor horsepower against suction capacity (CFM). For example, if you compare all the dust collectors with 1-hp motors, the one with the highest CFM rating (assuming an equal static pressure) will be the most efficient design.

Note in the chart on page 59 that several of the collectors with larger motors require a 220-volt power supply. But most operate on 110 volts. You can wire some of the units for 110 or 220.

Consider Sparkproof Blowers

In all dust collectors, sawdust passes directly through the blower. Blowers with steel impellers (fans) and/or housings have the potential to spark, which could ignite the sawdust. This potential increases if you're using the collector on machines that produce fine sawdust, such as sanders.

Blowers with steel impellers in a plastic, fiberglass, or aluminum housing — or vice versa — may spark if hit by a piece of metal sucked into the blower. But this is unlikely to happen unless you're using the dust collector as a vacuum cleaner.

Collectors equipped with all-steel blowers have the greatest spark potential. A sawdust fire may result if the fan loosens on the shaft and hits against the blower, which creates a shower of sparks. The safest blowers in this regard have an impeller and housing made of cast aluminum or plastic, which won't spark. See the photos *below.*

Because of the various sparking potentials of blowers, we feel obligated to point out these differences. But we consider even the collectors without sparkproof blowers to be relatively safe machines — if you use them for their intended purpose and keep them well maintained. The chart on page 59 lists the materials used for impellers and housings of the collectors we reviewed.

Waste Containers: What To Look For

In a word, convenience. You should be able to remove and replace the waste bag or barrel easily. And it should have enough storage capacity so you don't have to empty it too frequently.

As mentioned earlier, we found the barrel-type two-stage collectors less convenient to empty than the bag-type collectors. Of the bag-types, we liked the convenience of disposable plastic waste bags, such as those found on the Elektra Beckum, Inca, and Shopsmith. You can buy replacement bags from the distributors. We found that 25"x35", 2.5-mil trash compactor bags fit the Inca and Elektra Beckum.

Most bag-type collectors, though, use cloth bags — one for filtration and one for waste collection. The large Taiwanese machines, represented by the Grizzley, use the same principle, but add a second set of bags. This not only increases waste storage capacity, but provides the filter area required for their more powerful blowers.

If you'll be using your dust collector on a machine that kicks out a lot of wood debris in a short time, you'll want a collector with plenty of storage capacity. As a test, we ran 50' of 6"-wide boards through our 13" Foley-Belsaw planer pictured on page 55, taking a 1/16" cut on both sides of the boards. This produced a little over 1 cubic foot of sawdust and shavings in about five minutes. By checking the storage capacities of the varous collectors listed in the chart on the next page, you'll get a good idea of how frequently you'd need to empty the waste container of each, doing essentially the same operation.

Filter Bags: Look For Sturdy Tie-Downs

As the waste container fills and the filter bag becomes clogged with fine sawdust, back pressure increases. In some cases, if this pressure becomes high enough, it can blow the filter bag off the col-

Welded-steel fan and stamped-steel fan housing make a blower prone to sparking should the fan loosen and hit the housing. Cast-aluminum fan and blower typify sparkproof design. Aluminum or plastic fans and housing won't spark.

The Kraemer uses a wide steel band clamp with a quick-release to fasten the filter bag to the blower outlet.

PORTABLE DUST COLLECTORS

MANUFACTURER	MODEL NUMBER	TYPE[1]	BLOWER				MOTOR				WASTE			SIZE (H x W x L - IN.)	FEATURES[6]		WEIGHT (LBS.)	SUGGESTED PRICE[7]
			SUCTION CAPACITY[2]	IMPELLER[3]	HOUSING[3]	INLET DIAMETER[4]	TYPE[5]	HORSEPOWER	VOLTS	AMPS	BAG/BARREL (BL)	STORAGE CAPACITY (CU. FT.)	FILTER BAG AREA (SQ. FT.)		STANDARD	OPTIONAL		
Delta	50-180	T	700 @ 4½"	C	S	6"	TEFC	1	120/240	11/5.5	BL	6.5	9	52x26x34	A	B,C,D,E	72	$481.50
Delta	50-181	T	1,100 @ 8½"	C	S	6"	TEFC	2	120/240	25.2/12.6	BL	6.5	9	52x26x34	A	B,C,D,E	97	$684.30
Delta	50-182	T	1,300 @ 10"	C	F	6"	TEFC	3	230	8.5	BL	6.5	9	58x26x34	A	B,C,D,E	113	$796.65
Dust King[8]	750-2	T	450 @ 5"	C	C	4"	TEFC	½	110/220	8/4	BL	7	8½	48x24x36	A,C	B,D	45	$279
Dust King	750-3	T	750 @ 5"	C	C	5"	TEFC	1	110/220	12/6	BL	7	12	48x24x36	A,C	B,D	55	$349
Dust King	5000	S	1,850 @ 5"	C	C	6"	TEFC	5	220	21	BAG	9.4	18.8	84x24x84	A	B,D	140	$695
Elektra Beckum	SPA 1000	S	765 @ 4.72"	P	P	4"	TEFC	¾	220	2.3	BAG	3.3	—	66x24x24	A,B	E	54	$475
Foley-Belsaw	3340902	T	500 @ 3"	C	C	4"	TEFC	½	115	7.4	BL	6.5	5.5	52x24x24	C	A,D,E	60	$298
Grizzley[9]	G1030	S	1,515	S	S	6"	TEFC	3	115/230	34/17	BAG	9	29.8	78x21x47	B,D	A	270	$455
Inca	101K01.01	S	690 @ 3.35"	S	S	4"	TEFC	½	115	9.5	BAG	3.3	10	80x15x28	B	A,D,E	90	$495
Jet[10]	DC 610	S	610 @ 5.51"	S	S	4"	TEFC	1	115/230	10/5	BAG	2.12	8	60x14x28	B	—	75	$362
Kraemer	S-1	S	810 @ 1"	C	S	6"	TEFC	1	110/220	12/6.5	BAG	5	12	38x20x40	B	A,D	95	$995
Makita	410	S	300 @ 20"	S	S	3"	TEFC	1½	100	11	BAG	7	—	—	A	D,E	20	$410
Shopsmith[11]	DC 3300	S	330 @ 6.6"	P	S	2¼"/4"	ODP	½	110	6.7	BAG	4	6.8	48x21x26	A,B,D	E	—	$499
Startrite	55	S	565	S	S	4½"	TEFC	¾	110	10/5	BAG	5	—	72x24x35½	A,B	D	110	$699
Startrite	75	S	1,045	S	S	6¼"	TEFC	1	110	10/5½	BAG	9	9	92x24x43	A,B	D	130	$949
Sunhill[12]	UFO 101	S	1,182 @ 8.1"	S	S	5"	TEFC	2	110/220	24/12	BAG	5	13	80x34x24½	B,D	none	200	$359
Total Shop	TS 110	S	610 @ 4.5"	S	S	4"	TEFC	1	110/220	10/5	BAG	2.2	8	60x15x30	B	A	77	$199
Williams & Hussey	54-402	T	450 @ 7"	C	S	4"	TEFC	½	115/230	8.8/4.4	BL	3.2	10.6	48x19x19	A,D	B,C,E	48	$349.95
Williams & Hussey	54-403	T	700 @ 4½"	C	S	5"	TEFC	1	115/230	12/6	BL	6.5	19.0	48x19x19	A,D	B,C,E	72	$429
Wilke	SFO 15	S	700 @ 4½"	S	S	6"	TEFC	1	115/230	14/17	BAG	2.9	11.1	61x17x36	B,D	A	89	$295
Wilke	SF002	S	1,100 @ 8½"	S	S	8"	TEFC	2	115/230	20/10	BAG	6.5	18.8	89x20x37	B,D	A	100	$475
Wilke	SF003	S	1,300 @ 10"	S	S	10"	TEFC	3	115/230	36/18	BAG	20.9	70.8	117x24x63	B,D	A	121	$695
Woodmaster	820	S	450 @ 5"	C	C	5"	TEFC	½	110/220	8/4	BL	7.35	22	78x24x36	A	E	54	$289

1 – (S)ingle stage (T)wo stage

2 – Cubic feet at inches static pressure (mfr. ratings)

3 – (C)ast aluminum (F)iberglass (P)lastic (S)teel

4 – Outside diameter. May include reducer or multi-hose fittings to accept smaller size hoses.

5 – (TEFC) Totally enclosed fan cooled (ODP) Open, drip proof

6 – (A) Hose (B) Stand (C) Waste barrel (barrel types only) (D) Multi-hose adapters (E) Collector fittings for woodworking machines

7 – Many collectors discounted 10-30% below list.

8 – Made by BEC Industries

9 – Jet, Sunhill, Total Shop offer similar machines.

10 – Grizzley, Sunhill, Total Shop offer similar machines.

11 – Comes with vacuum wand and fittings; can be used as a shop vacuum.

12 – Grizzley, Jet, Total Shop offer similar machines.

lector. People in the dust-collector industry refer to this as "blowoff."

To prevent blowoff, look for a sturdy tie-down on the filter bag. Though easier to use, most drawstrings and cloth straps won't secure the bag as well as a metal band clamp. Most band clamps require a screwdriver to remove and replace. We like the tie-down on the Kraemer — a wide steel band clamp with the added convenience of a quick-release lever (see photo *at left*).

Noise: You'll Have To Live With It

Dust collectors, like shop vacuums, make a lot of noise. Add this to the noise the power tool makes, and you may find yourself having to wear earplugs!

Large machines like the Grizzley and Sunhill make the most noise. But they also have plenty of suction capacity, so you could put them in a room adjacent to your shop and run ductwork through the wall to your machines.

But aside from noise level, you may find the high-pitched whine made by some machines (such as the Inca and Elektra Beckum) more irritating than the low-pitched noises made by some other units. For their size, we found that the Delta, Dust King, Foley-Belsaw, and Shopsmith made the least objectionable noise.

Produced by Jim Barrett, with George Granseth
Photographs: Bob Calmer
Illustrations: Bill Zaun

READERS, IT'S YOUR TURN!

PROJECT

Again you've shown us how your skill combines with wood in a variety of projects. From baskets to tiny turnings, your craftsmanship stands out.

FROM TREES SMALL BASKETS GROW

Susi Nuss, 37
Bolton, Conn.
Part-time basketmaker, mom

Susi's pioneer ancestors made wood splint baskets when Connecticut was frontier. Some of those original baskets — passed down through her family — now serve as models for her work.

In historic tradition, Susi makes all her baskets completely by hand, and with materials she prepares herself. The 4"- to 9"-diameter and 5"- to 15"-deep baskets shown began in the forest as small black ash trees. Susi fells a tree, then strips it of bark. Next, she pounds the tree from top to bottom to loosen the layers of wood which she peels off in strips. These become her weaving splints, which can look and feel like "wooden velvet" after they're scraped and burnished.

For consistency, Susi weaves her baskets over pine forms, then attaches hickory handles. The soft sheen of the strips comes natural, no finish needed.

TRIMMING DOWN GRANDFATHER

Darrel Mathieu
Brainerd, Minn.
Employment Counselor

Darrel prefers clean, straightforward lines, so he trimmed down traditional style and designed his own grandfather clock. The result, we think, looks striking.

The tall and trim solid-walnut clock case measures 16"x1'x6' and complements the rest of his home furnishings in design and color. Glass in the doors and sides show off the works. "I didn't want to break up the lines with knobs on the doors, so I installed magnetic catches instead," he tells us.

Darrel even gave the clock works a more contemporary look. He replaced the original face with a square of polished brass, then marked the quadrant hours with walnut screw-hole buttons. Rabbets cut into the stiles and rails accept the glass. The plywood back was painted black, and the walnut finished with clear Danish oil.

Print this article

SHOWCASE

LOTS OF ROOM FOR LOAVES

Doug Boettger, 39
Waterloo, Ont., Canada
Teacher, science and physical education

You might consider Doug a two-tool craftsman, and by the looks of his project, a good one. Believe it or not, he used only a router and jigsaw to build this oversized, imitation rolltop breadbox.

He cut the basic box from a 2x4′ piece of ¾″ edge-joined pine with his jigsaw. After gluing and nailing the butt joints, Doug sunk the nailheads and plugged them. Chair rail molding became trim for the base.

For the fake rolltop, Doug edge-joined half-round molding and surrounded it with a rabbeted frame which he hinged to the box at the top. He used his router to rabbet the sides of the box to provide a rest for the rolltop lid and to make the dadoes for an inside shelf. Finished with clear, flat polyurethane, the 17x15x14″ breadbox provides his wife with lots of kitchen storage.

"I usually give what I make away as gifts for my family. This happened to be a Christmas present," says Doug.

Doug, with results like this, have you ever considered teaching woodshop?

A TALE OF TINY TURNINGS

Robert Olaf Swanson, 40
Phoenix, Ariz.
Asst. Power Plant Superintendent

Not intentionally a preservationist, Bob has saved a lot of cedar in the last few years. That's because he makes his own pencils from wood he collects, like these of olive wood.

Bob, a member of the International Wood Collectors' Society, set out two years back to uniquely display his wood collection. What better way than to turn it into the barrels for mechanical pencils?

Starting with a ¾x¾x5½″ piece of wood, Bob first drills a hole down the length with a special boring jig. Then, he inserts either 9/32″- or ¼″-diameter brass tubing at both ends of the hole and glues it in place. At his lathe (a full-size one), Bob mounts the stock between centers and turns it to shape with a 1″ gouge, a ¼″ gouge, and a parting tool.

After sanding, the barrel receives a mixture of tung oil and mineral spirits. Lastly, Bob applies a wax.

What goes inside? "I buy Pentel mechanical pencils at about $3.50 each, take off the barrel and throw it away, then insert the mechanism," Bob replies.

To submit your projects...

Send a 35-mm color slide *only* (no prints) with the project as the focal point and a simple background — no people. Include a capsule description — materials, joinery, finish, and dimensions, for example. *WOOD* will pay $25 for published projects. Slides cannot be returned unless you enclose a self-addressed, stamped envelope. **Project Showcase**
Better Homes and Gardens®
***WOOD* Magazine**
Locust at 17th
Des Moines, IA 50336

WOOD'S BACK-TO-BASICS SHOP LATHE

If you are considering a lathe, or even if you already have one, we invite you to take a closer look at ours. It runs smooth and quiet. The hefty bed, headstock, and tailstock combined with the 1" shafts enable you to concentrate on turning, without distracting vibrations. Although the cost may appear a bit steep ($475), we found it holds its own in our shop against commercial models costing twice the price.

Note: *To help you with the parts, we've found mail-order sources for all the items you may not be able to buy at your local hardware store.*

START WITH THE BED

1 Crosscut a 4x8 sheet of ¾" plywood (we used birch veneer) to 71". Rip six strips (A) 7¾" wide from it. Glue and clamp three pieces together face to face for each "way" (horizontal bed member), with edges and ends flush.

2 After the glue dries, remove the clamps and scrape off the excess glue from *one* edge of each way. Position the table saw rip fence 7⅝" from the inside edge of the saw blade. Place the scraped edge against the fence and with another person's help, trim the opposite edge smooth on each way. Reposition the fence 7½" from the blade and trim the opposite edge of each way. Crosscut one end of each way square, and then cut both to 70".

3 With a helper and a dado blade mounted to the table saw, cut a 1³⁄₁₆" stopped groove ⅝" deep along the inside edge of each way where shown on the Bed Assembly Drawing. (We marked the groove locations on each way before cutting to ensure a matching pair.) The grooves hold the sliding assembly for the tailstock and tool rest.

4 Cut eight ¾" birch spacer pieces (B) to 3¾x11¾" long. Now, glue and clamp two pairs of four pieces face to face to make two spacers. Following the same procedure as used to true up the ways, remove the glue and trim each spacer to 3½"x11½" long.

5 Mark the location and bore a pair of ½" holes through the top of each spacer, 3" in from each end and centered from side to side. (See the Spacer Block Detail.)

6 Using the dimensions on the Bed Assembly Drawing, lay out and mark the location of the eight ½" holes on the front way. With a ½" bit chucked into the drill press, bore the holes. Clamp the second way to the first face to face with the *top* edges and ends flush.

Using the holes in the front way as a guide, bore about ⅛" into the second way. Unclamp the ways, go back to the drill press, and finish boring the ½" holes through the second way. Position the spacers (one on each end) with the ends and bottoms flush with the ways, and repeat this process to mark and bore three ⅝" holes through each spacer.

7 Bolt the ways and spacers together. Using a square, check that the *top* edges of the ways are parallel and square as shown in the photo *above*. The oversized holes in the ways and spacers allow free play to align the ways. Now, remove the bolts. Glue and rebolt the ways and spacers together, again checking for square. Belt-sand the top edges of the ways smooth.

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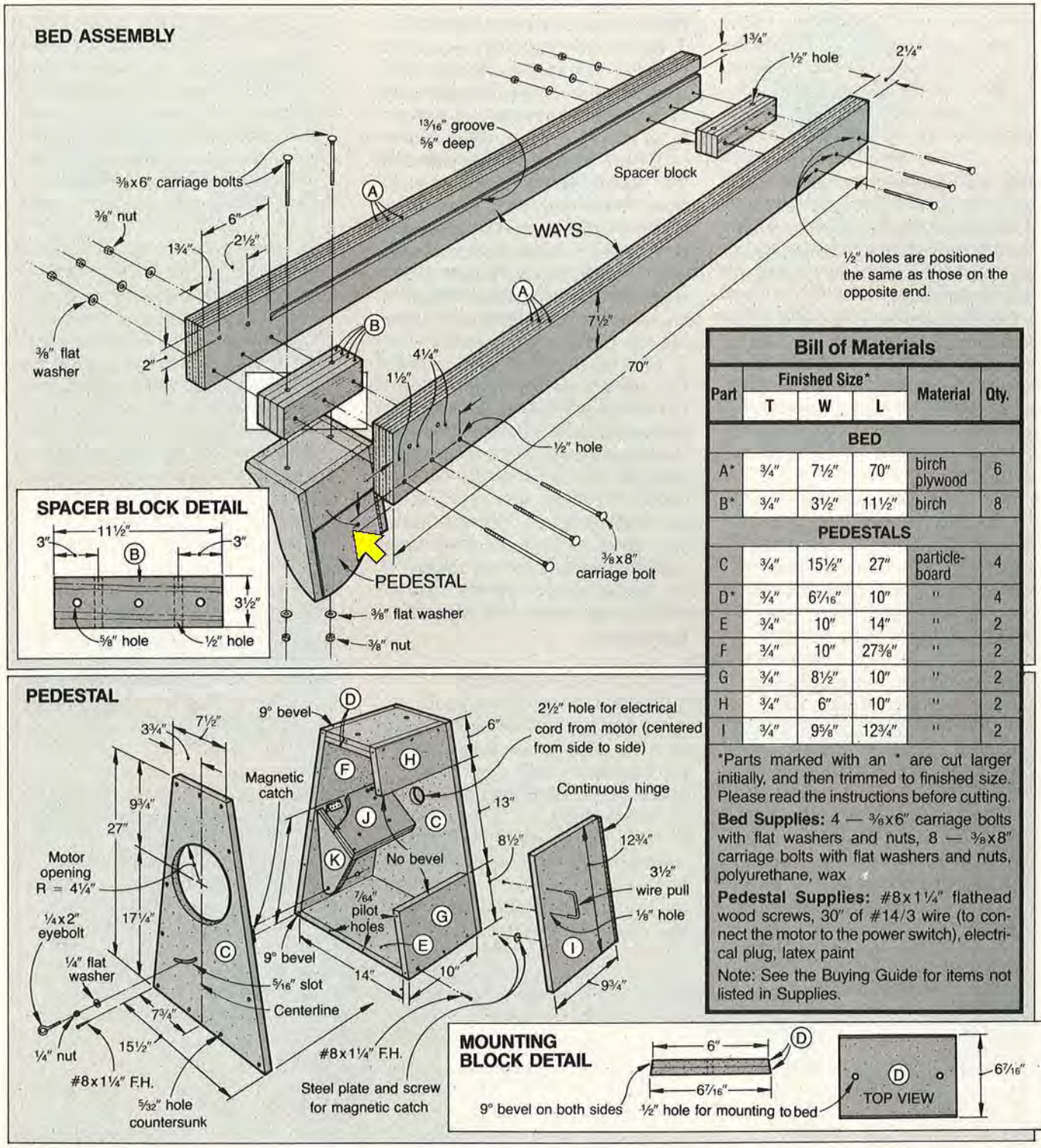


Bill of Materials

Part	Finished Size* T	W	L	Material	Qty.
BED					
A*	¾"	7½"	70"	birch plywood	6
B*	¾"	3½"	11½"	birch	8
PEDESTALS					
C	¾"	15½"	27"	particle-board	4
D*	¾"	6 7/16"	10"	"	4
E	¾"	10"	14"	"	2
F	¾"	10"	27⅜"	"	2
G	¾"	8½"	10"	"	2
H	¾"	6"	10"	"	2
I	¾"	9⅝"	12¾"	"	2

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Bed Supplies: 4 — ⅜x6" carriage bolts with flat washers and nuts, 8 — ⅜x8" carriage bolts with flat washers and nuts, polyurethane, wax

Pedestal Supplies: #8x1¼" flathead wood screws, 30" of #14/3 wire (to connect the motor to the power switch), electrical plug, latex paint

Note: See the Buying Guide for items not listed in Supplies.

CONSTRUCT THE PEDESTALS

***Note:** The two pedestals are identical except for the motor and electrical cord cutouts in the headstock pedestal.*

1 Cut four pieces of ¾" particleboard to 15½x27" long. Lay out one of the pedestal sides (C) on one of the pieces, using the dimensions on the Pedestal Drawing *above* as a guide. Using a straight board as a fence and a portable circular saw, cut the side piece to shape. Use this piece as a template to mark the other three sides, and then cut them to shape with the portable circular saw and fence.

2 Cut the motor opening in one of the sides and a cord-access hole in another (see the Pedestal Drawing for dimensions).

3 To make the 1½"-thick pedestal tops (D), start by cutting four pieces of ¾" particleboard to 7x11". Glue and clamp two pieces together face to face to make each top. Set your

Continued

table saw blade 9° from center and bevel-rip the two side edges to finished width (6 7/16"), and then crosscut to length (10") on the radial arm saw (see Mounting Block Detail on the previous page).

4 Cut the bottoms (E), backs (F), front parts (G, H), and doors (I) to the sizes listed in the Bill of Materials, bevel cutting both ends of the bottoms and backs, the bottom edge of G, and the top edge of H at 9° where shown on the Pedestal Drawing.

5 Dry-clamp each pedestal together (minus the doors), and check the fit. Using the pilot and shank hole sizes stated on the Pedestal Drawing, drill and countersink all the holes. Then, glue, clamp, and screw each pedestal together. *DO NOT* glue the pedestal side with the motor hole in it. Screw it in place for now, we'll glue it in place later.

6 Drill the holes, and fasten a wire pull to each door. Cut two pieces of continuous (piano) hinge 12¾" long. Attach a hinge to each door, and then mount the doors to the pedestals. Attach magnetic catches to the pedestals and steel plates to the doors (see the Buying Guide on page 111 for our hardware source).

NOW, THE MOTOR MOUNT

1 Cut the top piece (J) to size. Drill the ¼" holes and mount the hinges to the top piece using the Motor-Mount Drawing as a Guide.

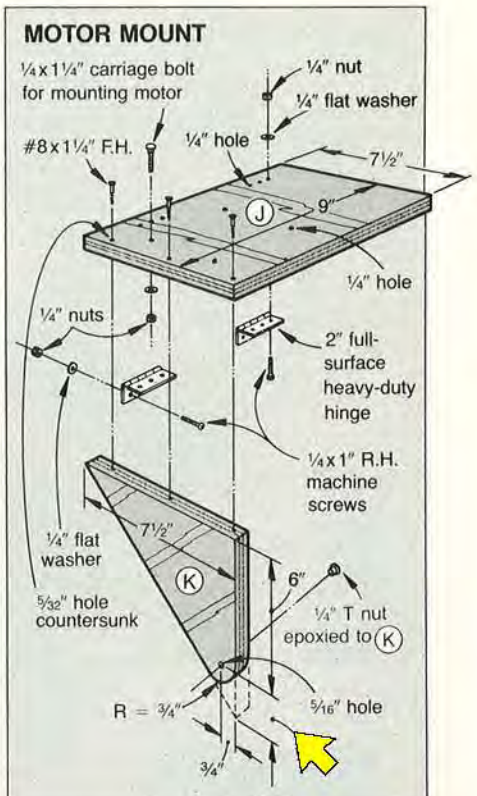
2 To make the vertical support (K), cut a piece of ¾" plywood to 7½" square. Draw a diagonal line from corner to corner, and cut along the line to cut the piece in two. On one of the pieces, lay out the 5/16" hole and ¾" radius on the support. Cut the radius to shape and drill the hole. Glue and screw the top piece to the support.

3 Working inside the motor pedestal, measure up 14" from the top of the base (E) and make a mark across the back piece (F) where shown on the Pedestal Drawing. Hold the motor mount so the top face of (J) aligns with the marked line and against the left-hand side (C). Mark the location of the hinge holes on the back piece, remove the motor mount, drill the holes, and bolt the motor mount to the back piece.

ATTACHING THE BED

1 Position the pedestals about 4' apart. Lay the bed assembly on top of the two pedestals. Reposition the pedestals so the ends of the bed are flush with the outside face of each pedestal.

2 Using the previously bored holes in each spacer (B) as guides, bore two ½"-diameter holes through the top of each pedestal. Bolt the bed to the pedestals.



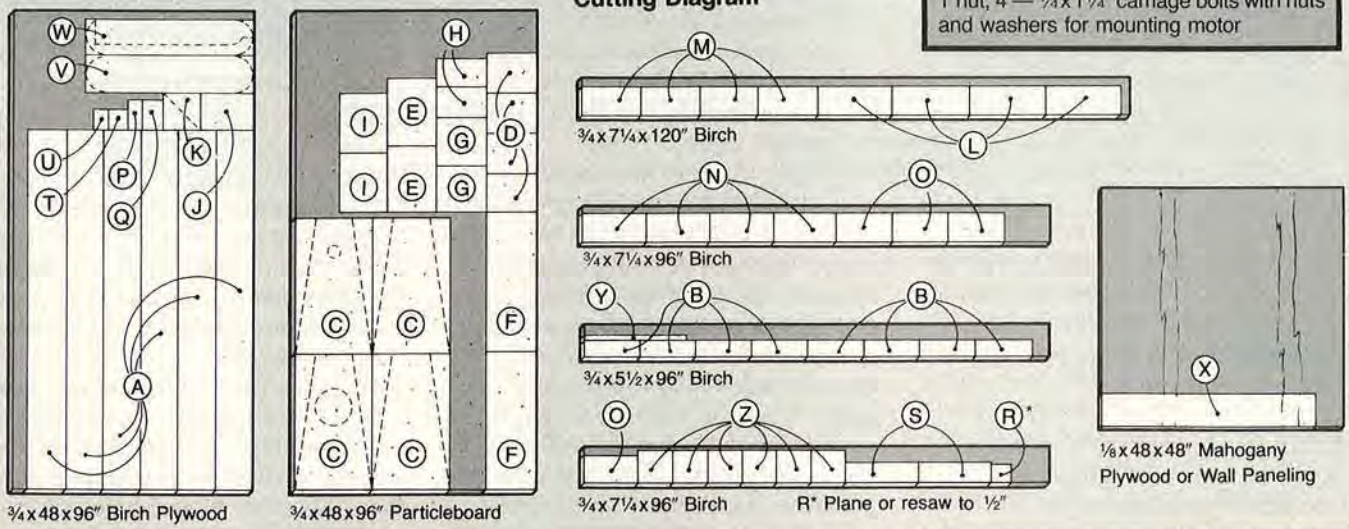
Bill of Materials

Part	Finished Size* T	W	L	Material	Qty.
MOTOR MOUNT					
J	¾"	9"	7½"	birch plywood	1
K*	¾"	7½"	6¾"	birch plywood	1

*Part marked with an * is cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Motor Mount Supplies: #8x1¼" flathead wood screws, 1 pair — 2" full-surface heavy-duty hinges, ¼x1" roundhead machine screws with flat washers and nuts, ¼x2" eyebolt with nut and washer and T nut, 4 — ¼x1¼" carriage bolts with nuts and washers for mounting motor

Cutting Diagram



LAMINATE AND MACHINE THE HEADSTOCK

***Note:** We give a source for the spindles in our Buying Guide on page 111. If you wish to have them made locally, take the Spindle Drawings on pages 65 and 66 to a machinist. You need both spindles to continue construction.*

1 Cut four pieces of ¾" birch to 6¼x15½" long for the middle section of the headstock (L). Glue and clamp the pieces together with the edges and ends flush. Again, following the same procedure used to true up the ways, remove the excess glue and trim the lamination to 6x15".

2 Check the fit of the lamination between the ways; sand the bottom 4" if necessary for a snug fit.

3 Cut four pieces of ¾" birch to 6¼x11½" for the outer sections (M). Glue two pieces of birch together face to face for each outer section. Rip and crosscut each lamination to 6x11".

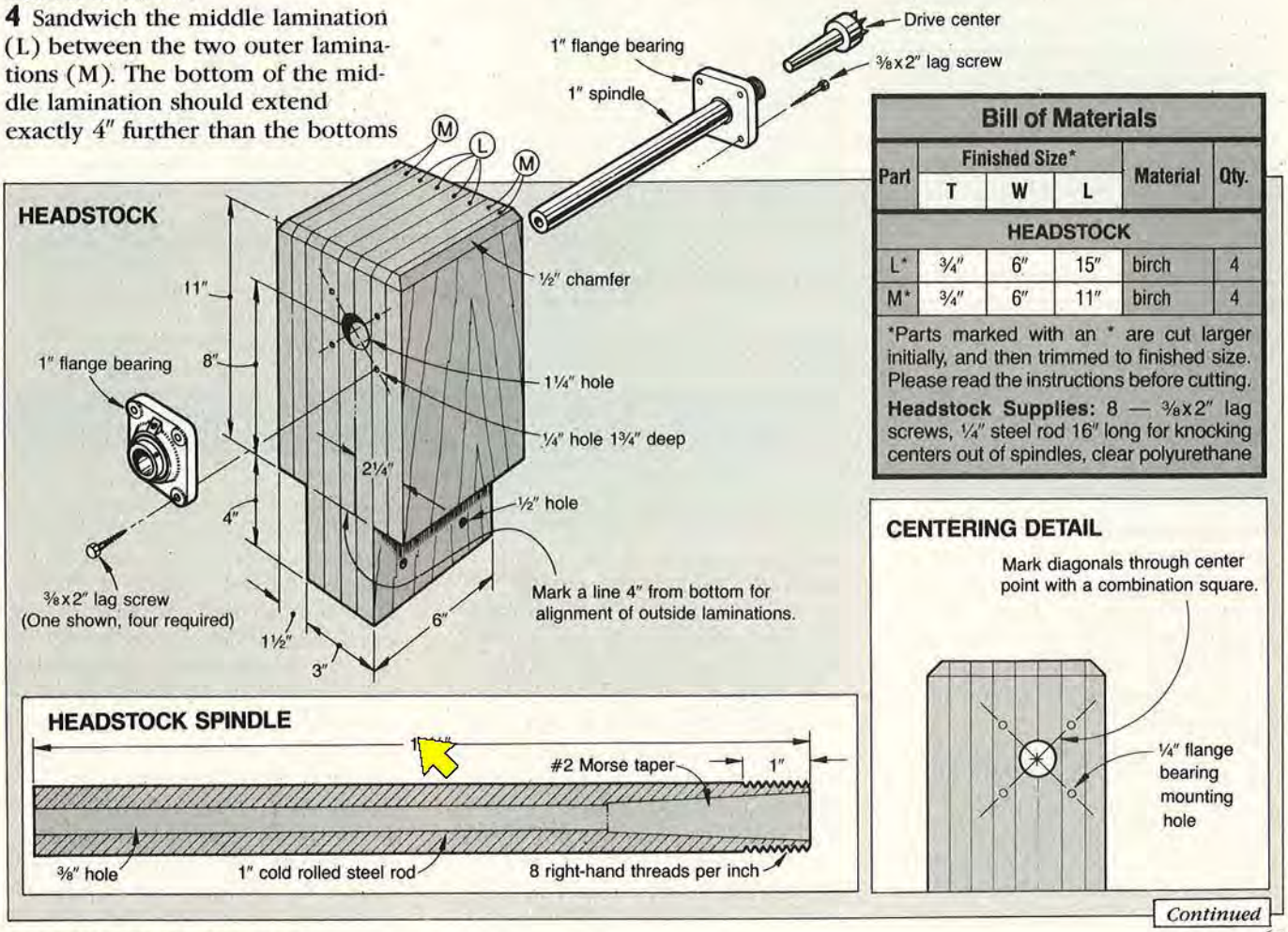
4 Sandwich the middle lamination (L) between the two outer laminations (M). The bottom of the middle lamination should extend exactly 4" further than the bottoms of the two outer laminations. Apply glue to the mating surfaces, *carefully* align the edges, and clamp the headstock together. Later, remove the excess glue and belt-sand smooth.

5 Position the headstock between the ways, flush with the end of the bed. Using the two previously bored ½" holes in the front way as guides, bore about ⅛" into the headstock to mark the hole locations. Remove the headstock and use a drill press to finish boring through it.

6 Using the dimensions on the Headstock Drawing as a guide, mark the location of the spindle hole on the headstock. Use a combination square to mark diagonal lines like those shown on the Centering Detail. (You'll use the diagonals to align the flange bearings later.) With a drill press, bore a 1¼" hole *completely* through the headstock (we used a spade bit to bore as deep as possible, and then added a bit extension to finish boring the hole). Again, using a combination square, mark diagonals centered on the 1¼" hole on the opposite end of the headstock.

7 Rout a ½" chamfer along the top edges of the headstock.

8 Bolt and glue the headstock to the bed assembly. Slip one bearing onto the headstock spindle, insert the spindle through the 1¼" hole in the headstock, and slide the other bearing in position on the opposite end. Using the diagonals marked earlier, center the bearings over the 1¼" hole on the headstock, and mark the location of the bearing mounting holes. Remove the bearings and spindle from the headstock, and drill the mounting holes. Screw the bearing-spindle assembly to the headstock. Lock the spindle in position so that 1⅛" of the threaded end of the spindle extends beyond the inboard edge of the headstock. (See the Buying Guide for a source for these items.)



Bill of Materials

Part	Finished Size* T	W	L	Material	Qty.
HEADSTOCK					
L*	¾"	6"	15"	birch	4
M*	¾"	6"	11"	birch	4

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Headstock Supplies: 8 — ⅜x2" lag screws, ¼" steel rod 16" long for knocking centers out of spindles, clear polyurethane

Continued

WOOD'S BACK-TO-BASICS SHOP LATHE

BUILD AND ASSEMBLE THE TAILSTOCK

1 Cut four pieces of ¾" birch to 6¼x13" to form the middle lamination (N). Cut or rout a ½" groove ½" deep, centered from edge to edge, the length of one of the pieces. Glue and clamp the four pieces together face to face, with the grooved piece in position where shown on the Tailstock Drawing at *right*. Later, remove the excess glue, and trim to 6x12½", following the same procedure used to true up the ways.

2 Check the fit of the middle section between the ways. If necessary, belt-sand the bottom 1½" so the bottom of the lamination slides easily between the ways (be careful not to sand above the 1½" mark).

3 Cut four pieces 6¼x11½" from ¾" birch for the two outer laminated sections (O). Glue two sets of two pieces together face to face. Rip and crosscut each outer lamination to 6x11" long.

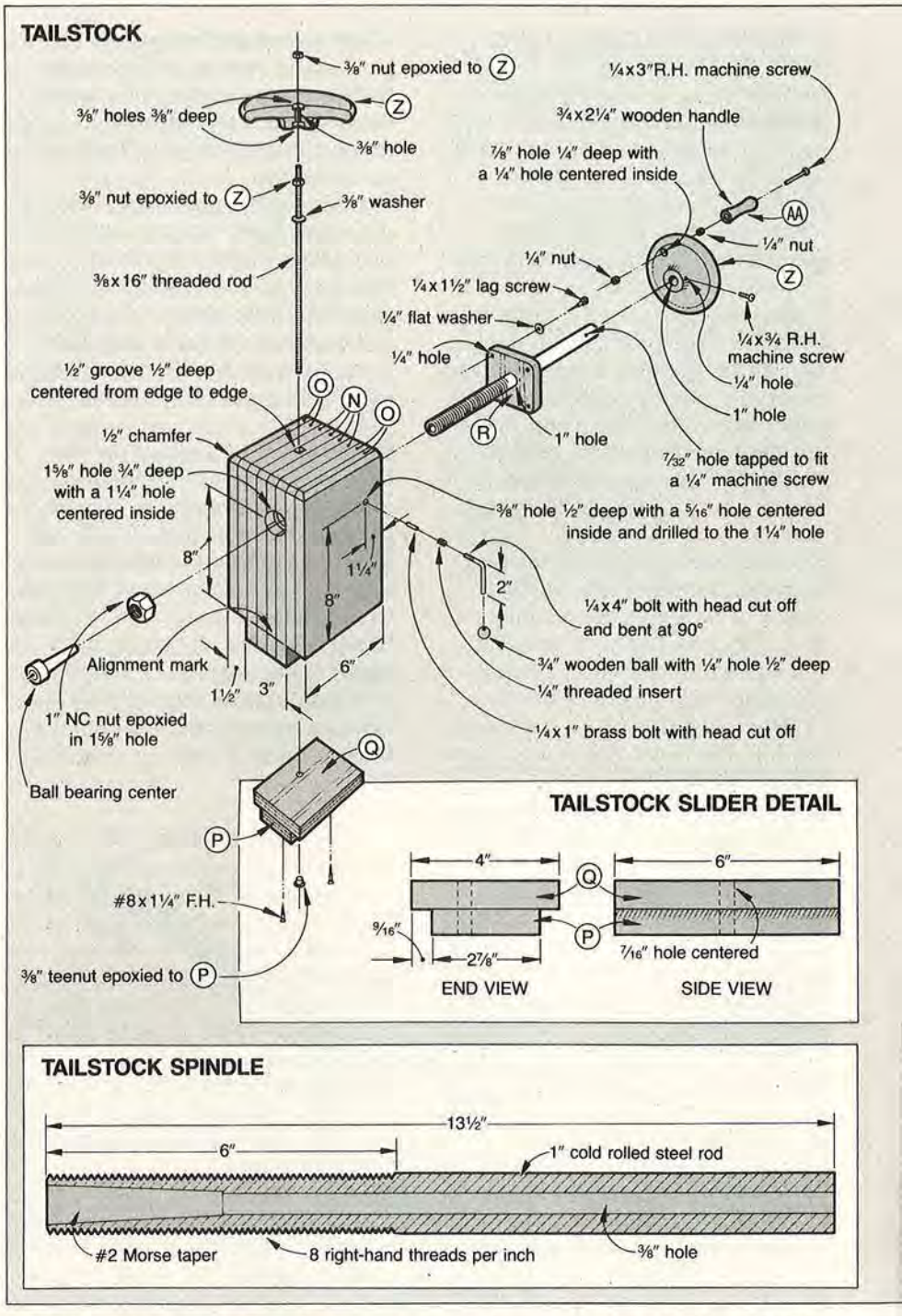
4 Sandwich the middle lamination between the two outer laminations and repeat the procedure in step 4 of the headstock lamination, positioning the bottom of the center lamination 1½" below the bottom edges of the two outer laminations. Later, remove the excess glue from the tailstock, belt-sand smooth, and rout the chamfer on the top edges.

5 Cut the sliding assembly (P, Q) to the sizes listed in the Bill of Materials and shown on the Slide-Assembly Detail. With the ends flush, position the smaller piece (P), centered from side to side, on the larger piece (Q), and glue and screw it in position. Then, cut the spindle positioner (R) to size from ½" birch. Draw diagonals and bore a 1" hole through the center of the positioner.

6 Position the tailstock between the ways on the lathe. Slide and center the sliding assembly (P, Q) directly under the tailstock. Insert a ⅜x16" threaded rod through the ½" groove in the tailstock and mark its position on the sliding assembly. Remove the sliding assembly, drill a 7/16" hole through it where marked, and epoxy a ⅜" T nut in the hole on the bottom side. Slide the assembly back in position under the tailstock, and using a nut and washer on the top of the threaded rod, bolt the tailstock and sliding assembly together.

7 To mark the position of the spindle hole on the tailstock, start by positioning a drive center in the spindle mounted in the *headstock*. Slide the tailstock against the headstock spindle until the drive center leaves a small depression in the tailstock. Remove the tailstock and bore a 1⅝" hole ¾" deep where indented (we used a Forstner bit). Switch to a 1¼" bit, center in the 1⅝" hole and bore a hole completely through the tailstock.

8 Thread a 1" nut onto the end of the tailstock spindle and wrap tape around the spindle near its mid-

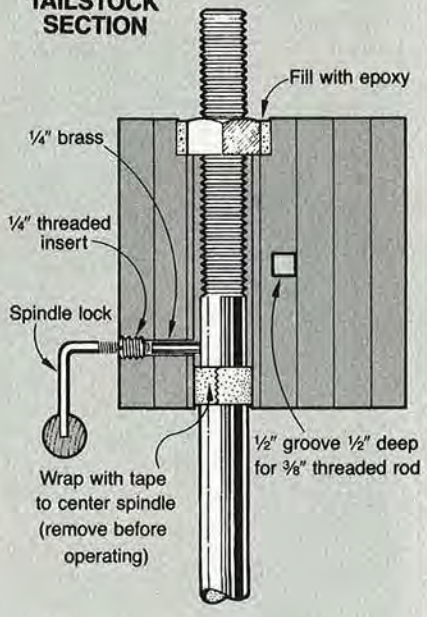


Bill of Materials					
Part	Finished Size*			Material	Qty.
	T	W	L		
TAILSTOCK					
N*	¾"	6"	12½"	birch	4
O*	¾"	6"	11"	birch	4
P	¾"	2⅞"	6"	birch plywood	1
Q	¾"	4"	6"	birch plywood	1
R	½"	3½"	3½"	birch	1

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Tailstock Supplies: ⅜x16" threaded rod with nuts and washers and T nut, #8x1¼" flathead wood screws, 1" NC nut, ¼x1½" lag screws with flat washers, ¼" brass bolt, ¼x4" bolt, ¾" wooden ball or door pull, ¼x3" roundhead machine screw with nuts, ¼x4" roundhead machine screw, ¾" birch dowel, clear polyurethane

TAILSTOCK SECTION

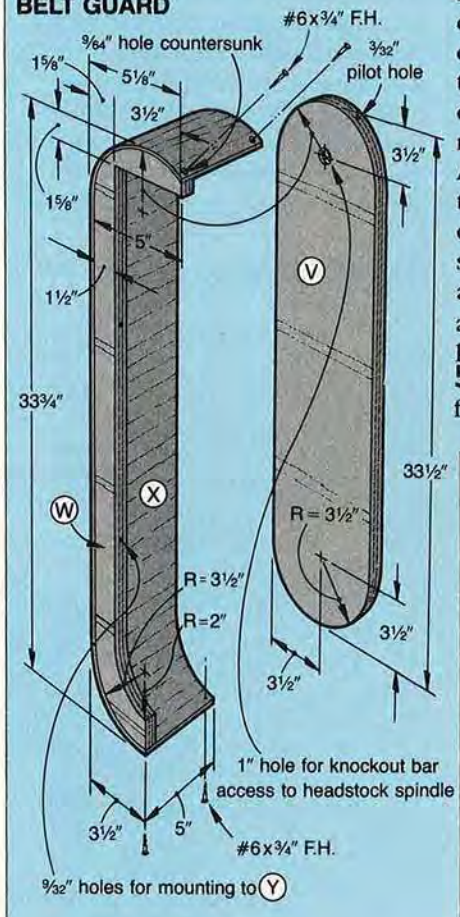

Fill with epoxy
¼" brass
¼" threaded insert
Spindle lock
½" groove ½" deep for ⅜" threaded rod
Wrap with tape to center spindle (remove before operating)

MAKING THE BELT GUARD

1 Cut two pieces of ¾" birch plywood to 7x33½" for the belt guard sides (V, W). Mark a 3½" radius on both ends of one piece, and using double-faced tape, tape it to the bottom of the other piece. Cut the two pieces to shape, sand the cut edges smooth, pry apart, and remove the tape.

2 Cut the notched portion of W to shape, using the dimensions on the Belt-Guard Drawing *below.*

BELT GUARD



3 Bore a 1" hole through V where marked. (The 1" access hole allows you to drive a knock-out rod through the headstock spindle to remove the drive center when changing to a faceplate.)

4 Rip and crosscut the wraparound piece (X) to size from ⅛" plywood or wall paneling. To make the plywood flexible, soak it in hot water. (We soaked ours in a bathtub for over an hour.) Wrap the plywood around the side pieces (V,W), clamp it in position with band clamps, and let dry. (It is important to have the wraparound piece clamped while it dries so it will maintain its curved shape when dry. Also, do not glue and screw until the wraparound has dried thoroughly, otherwise the glue won't stick to it.) Then, drill pilot holes, and glue and screw the wraparound to the two belt guard side pieces.

5 Cut the mounting strip (Y) to finished size.

Bill of Materials					
Part	Finished Size			Material	Qty.
	T	W	L		
BELT GUARD					
V	¾"	33½"	7"	birch plywood	1
W	¾"	33½"	5"	birch plywood	1
X	⅛"	39½"	5"	mahogany plywood	1
Y	¾"	¾"	20"	birch	1

Belt Guard Supplies: #6x¾" flathead wood screws, #8x1¼" flathead wood screws, 2 – ¼x1¾" carriage bolts with washers and wing nuts, latex paint

section to center the spindle in the 1¼" hole where shown on the Tailstock Section Drawing *above.* Lay the tailstock on its side so the spindle stands vertically and the nut faces up. Center, then epoxy the nut in the 1⅝" hole by filling the voids around the perimeter of the nut with sawdust-thickened epoxy. After the epoxy has hardened, turn the tailstock over, and drill mounting holes for the spindle positioner (R) on the side opposite the 1" nut. Remove the spindle from the tailstock, and remove the tape from the spindle.

9 To make the spindle lock assembly, start by drilling a ⅜" hole ½" deep into the side of the tailstock where shown on the Tailstock Drawings. Then, drill a 5/16" hole through the center of the ⅜" hole that reaches the 1¼" spindle hole. Screw a ¼" threaded insert into the ⅜" hole. Saw off the head of a ¼x4" carriage bolt and then, halfway along its length, bend it at 90° angle. Drill a ¼" hole ½" deep in a wooden ball or round door pull, and epoxy it to the non-threaded end of the bolt.

10 Cut the head off a ¼x1" brass bolt (the brass will not damage the tailstock spindle when tightening the spindle lock later). Working *inside* the 1¼" hole in the tailstock, insert the brass bolt into the 5/16" hole with a needle-nose pliers. Attach the spindle positioner.

Continued

WOOD'S BACK-TO-BASICS SHOP LATHE

NOW THE FUN PART — ASSEMBLING YOUR LATHE

1 Buy a 30″ length of 14/3 electrical cable and wire one end to the motor so the motor rotates in the direction shown on the Final-Assembly Drawing. Wire a 3-pronged (grounded) plug to the other end of the cable.

2 Attach the 1″ step pulley to the headstock spindle and the ⅝″ step pulley to the motor. Tighten the setscrews on each pulley. Clamp the motor to the motor mount and add the belt. Adjust the position of the motor so the pulleys align. Mark the motor hole locations on the motor mount, remove the motor, and drill the holes to size. Bolt the motor to the motor mount with carriage bolts and tighten securely.

3 To form the 5/16″ motor adjustment slot, start by moving the motor mount to its highest position. Stick a pencil through the hole in part K and move the motor mount and the motor up and down to scribe the slot. Remove the marked pedestal side (C) from the pedestal assembly, and drill a 5/16″ hole at each end of the marked slot. Now, cut the arc-shaped slot with a jigsaw. Position the pedestal side against the pedestal assembly, and check the slot in the pedestal side against the hole in K. Trim if necessary, and then glue and screw the pedestal side to the pedestal. Epoxy the T nut to the motor mount (see the Motor-Mount Drawing) and add the ¼ x 2″ eyebolt.

4 Run the belt from the motor pulley to the headstock pulley. Push down slightly on the motor to tighten the belt, and tighten the ¼″ eyebolt on the outside of the pedestal to hold the motor mount in position.

5 Mount the power switch on the front way above the motor pedestal. Plug the motor cord into the outlet in the power switch.

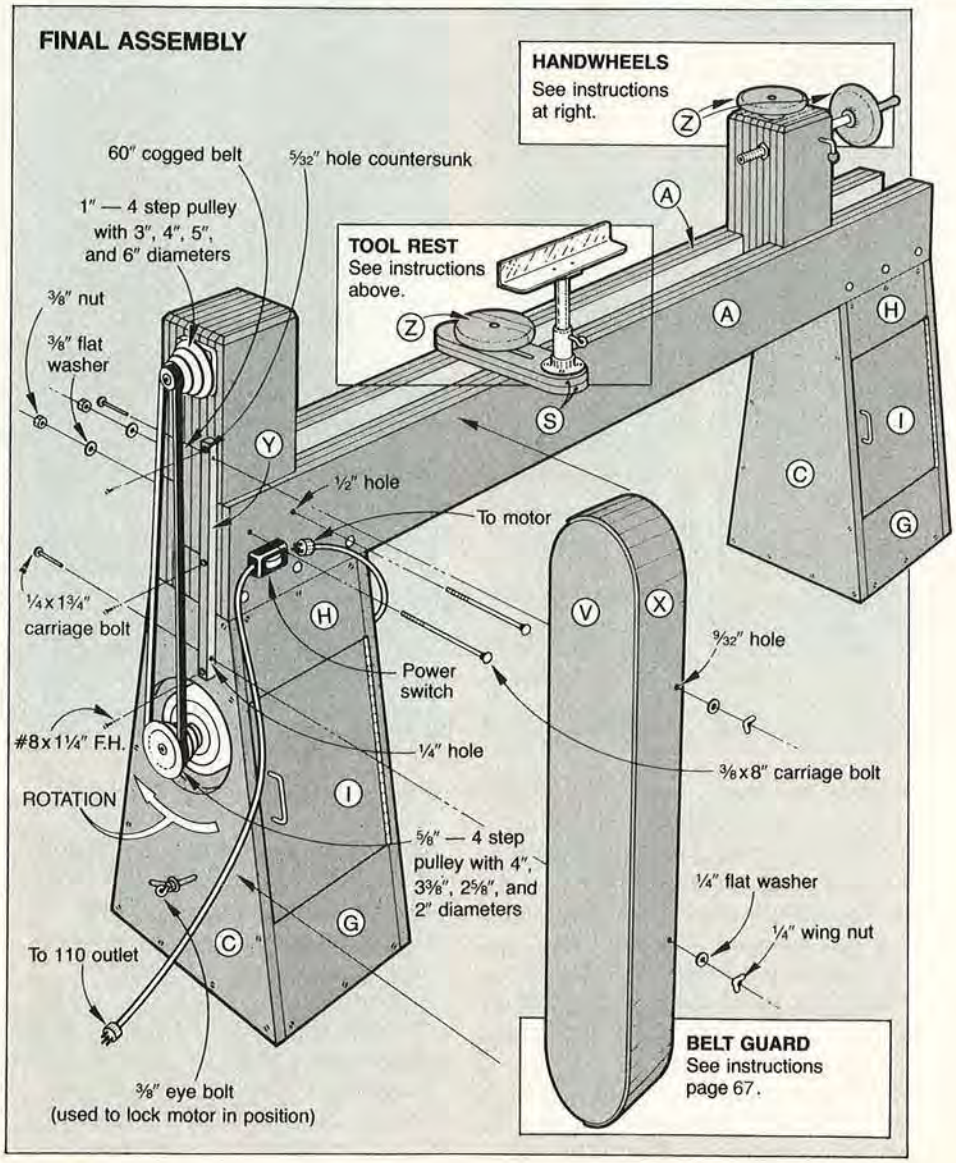
6 Remove or mask off all the hardware. Sand all of the wooden parts smooth. Paint the pedestals, belt guard, and metal tool rest parts. Apply clear polyurethane to the bed assembly, headstock, tailstock, and tool rest base. Later, remove the masking and apply wax to the groove in each way so the slide assemblies will slide easily in the grooves.

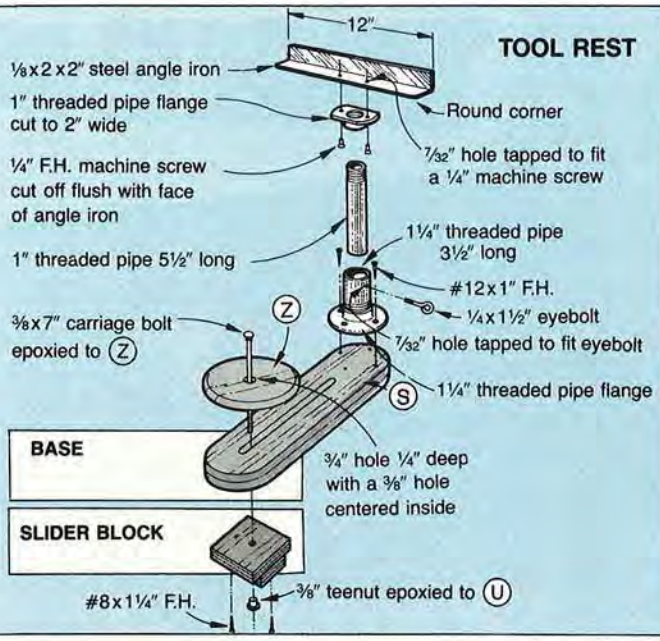
7 To attach the belt guard to the lathe, start by drilling 9/32″ holes and bolting the mounting strip (Y) to the guard (V, W, X). Then, position the assembly over the pulleys and belts. Working from the back side, mark the location of the mounting strip on the lathe and drill mounting holes in the lathe. Finally, separate the guard from the strip, screw the strip to the lathe, and then bolt the guard to the lathe.

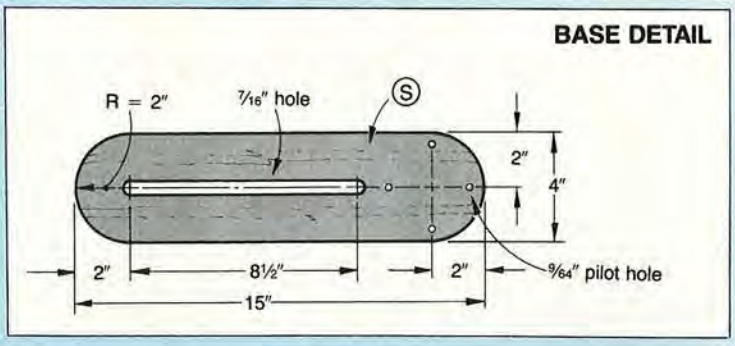
BUILDING THE TOOL REST

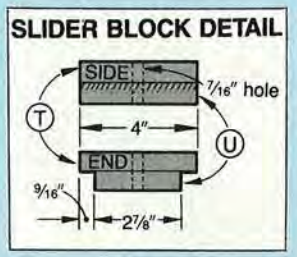
Using the dimensions on the Tool Rest Drawing and the two detail drawings at *right,* cut the parts to size and build the tool rest. (We cut the metal parts with a hacksaw and tapped the holes with the tap listed in the Buying Guide.) Make the tool rest base (S) out of laminated material for strength, and plenty long for sufficient reach when turning large-diameter bowls.

Rotating the handwheel (which we explain how to build later) loosens or tightens the sliding assembly (T, U) in the grooves in the bed. This allows you to position the tool rest where desired, and then fasten it firmly in place.




TOOL REST
12"
⅛x2x2" steel angle iron
1" threaded pipe flange cut to 2" wide
¼" F.H. machine screw cut off flush with face of angle iron
1" threaded pipe 5½" long
⅜x7" carriage bolt epoxied to Z
Round corner
7/32" hole tapped to fit a ¼" machine screw
1¼" threaded pipe 3½" long
#12x1" F.H.
¼x1½" eyebolt
7/32" hole tapped to fit eyebolt
1¼" threaded pipe flange
BASE
¾" hole ¼" deep with a ⅜" hole centered inside
SLIDER BLOCK
#8x1¼" F.H.
⅜" teenut epoxied to U

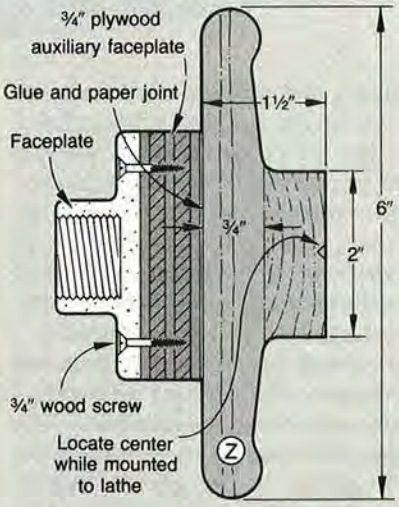




Bill of Materials					
Part	Finished Size T	W	L	Material	Qty.
TOOL REST					
S	1½"	4"	15"	birch (laminated)	1
T	¾"	4"	4"	birch plywood	1
U	¾"	2⅞"	4"	birch plywood	1

Tool Rest Supplies: ⅛x2x12" steel angle iron, ¼x½" flathead machine screws, 1" threaded pipe flange, 1¼" threaded pipe flange, 1x5½" threaded pipe, 1¼x3½" threaded pipe, ¼x1½" eyebolt, ⅜x7" carriage bolt with ⅜" T nut, #12x1" flathead wood screws, #8x1¼" flathead wood screws, clear polyurethane, enamel paint

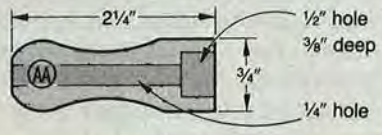
HANDWHEELS



Bill of Materials					
Part	Finished Size* T	W	L	Material	Qty.
HANDWHEELS					
Z*	1½"	6" diameter		birch (laminated)	3
AA	¾" diameter		2¼"	birch dowel	1

*Part marked with an * is cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

TAILSTOCK HANDLE



TURN THE HANDWHEELS USING YOUR NEW LATHE

1 Assemble the lathe as directed under ASSEMBLING YOUR LATHE on the previous page (don't forget the belt guard). For now, fasten the tool rest to the bed with a bolt and washer. Position the belt on the steps closest to the motor and headstock (575 rpm).

2 Cut six pieces of ¾" birch to 7x7" for the handwheels (Z). Laminate two pieces face to face to form each handwheel blank. Draw diagonals to find center, and scribe a 6¼"-diameter circle on each blank. Band-saw each to rough circular shape.

3 Glue and clamp a birch blank to an auxiliary faceplate using a paper and glue joint as shown on the Handwheel Drawing at *left*. Turn the handwheel to shape on your new lathe, sand smooth, and mark the center point. Separate the handwheel from the faceplate by prying the two apart at the glue joint with a chisel. Repeat step 3 to make the other two handwheels.

4 Using the dimensions on the Tailstock Drawing, drill the holes at the marked center point for mounting one handwheel to the tailstock spindle and one to the top of the tailstock. Drill the mounting holes in the third handwheel, using the dimensions on the Tool Rest Drawing.

5 Mount a handwheel to the tailstock spindle, drill a ¼" hole through the handwheel, and then drill a 7/32" hole into the spindle. Remove the handwheel and thread the hole in the spindle with a ¼" tap (see the Buying Guide). Insert a ¼" roundhead machine screw through the ¼" hole, and fasten the handwheel to the spindle. Drill the mounting holes for the wooden handle (AA) in the tailstock-spindle handwheel (see the Tailstock Drawing for hole dimensions). Finish all three handwheels, and then mount the other two.

6 To form the tailstock handle or crank (AA), first cut a piece of ¾" birch dowel 2¼" long. Using a drill press, drill the holes shown on the Tailstock-Handle Drawing. Turn the handle to shape between centers, then mount it to the handwheel on the tailstock spindle.

Turn to page 111 for instructions on using the lathe, the speed chart, and the Buying Guide.

Print this article

BE A BETTER
TAKE A

Workshops across the nation help you sharpen your skills, shape wood, and share with other craftsmen.

On a woodworking vacation you can really get into your hobby while you get away for awhile. Think of the great possibilities: clean mountain air and freshly sawn wood. A top-notch craftsman to answer your every question. A skill learned you've only dreamed about doing!

At a vacation workshop you'll rub elbows with other woodworkers of all ages, walks of life, and experience levels. They're diverse, so you can pick exactly what you want to do and how long you want to do it. In some instances, you may even make it a family affair where all members learn a craft, or share in recreation.

Since workshops not only vary by subject — from bowl turning to carving treenware, to making fine furniture with hand tools, and more — but by length and type of instruction, you'll want to consider your options thoughtfully. So, use our guidelines to help define more precisely what you would like to get out of a vacation workshop and which kind will fit you best. Then, turn to page 86, for a geographical listing of the many available.

Decide how much time you want to spend learning something new

Woodworking workshops vary in length from a few days to one to six weeks, but you'll find one-week courses the most common. Some workshops, taught on a one-on-one basis, adjust to the time you have available (usually a two- or three-day minimum).

When you write for information, specify not only the time of year but the length of courses you're interested in. Shorter, particularly weekend workshops, may not be listed in all brochures.

You'll want to check out full-time, year-round professional schools, too. While we don't always think of them as vacation workshops, many, such as Kirby Studios and The Rhode Island School of Design, offer shorter courses for the nonprofessional.

Which type of atmosphere is right for you?

You'll learn something about woodworking in any workshop worth its salt (or your money), but how comfortable you'll feel in the process can make all the difference in the world. In general, schools fall into the following categories, each with an atmosphere, and emphasis all its own.

Workshops where the whole family can vacation together. Selecting a workshop to attend that's located in a vacation area lets you tend to your hobby while the family enjoys other attractions. The Augusta Heritage Arts Workshop, for instance, nudges a national forest in West Virginia and sits an hour's drive away from two state parks and a major outdoor recreation area. In this campus setting, concerts, dances, and special activities abound in the evening when you and family members reassemble.

We find that most workshops specializing in woodworking won't allow children under 18 years old to attend. One exception, however, happens to be The Rhode Island School of Design, which has a special summer woodworking course for high school students. At Anderson Ranch Arts Center, in a valley near Snowmass, Colo., minors can't take woodworking, but they (or a non-woodworking parent) learn

WOODWORKER HOBBY VACATION

Far left. **Mountain setting and a variety of family activities makes Colorado's Anderson Ranch Arts Center a perfect woodworking vacation. Large building is the workshop, known as the Sam Maloof Woodbarn.**

Left. **At Tennessee's Arrowmont School of Arts and Crafts, top turners such as David Ellsworth teach students lathe skills. The climate favors outdoor work.**

Right. **Students in a fall workshop at Brookfield Craft Center, in Connecticut, take to the woods to mill lumber fresh off the stump. Courses cover such diverse topics as wooden boat building and timber frame construction.**

to create with clay, paper, paints, or camera while the woodworker attends class.

Woodworking taught as a craft among many. At crafts centers and in some university programs, woodworking workshops run concurrently with others in clay, glass, weaving, photography, and similar crafts. You may want to consider these schools for a vacation, particularly if your spouse's interests differ from your own.

Mingling with other craftspeople also may help you see new possibilities or techniques in wood. A potter, for instance, might advise a bowl turner on shape and form. Some schools actively promote this mixing, such as North Carolina's Penland School, the largest crafts school in the nation. Says its director, Verne Standord: "There's a saying going around, 'Hardening of the categories leads to art disease.' We try to soften those categories."

The Brookfield Craft Center, in Connecticut, offers training in a mix of 150 different crafts and techniques over the year. Arrowmont School of Arts and Crafts, which lies on 70 acres adjacent to the Great Smoky Mountains National Park in Tennessee, also emphasizes exchange of ideas between crafts. There, shops and studios sit close to each other and you'll get to see other crafts demonstrated.

In at least one case, at Augusta Heritage Arts Workshop, you can double-up your learning. After your day in woodworking, you have the opportunity to take a "mini-course" in a different craft during the evening.

Strictly for woodworkers. These workshops tend to be so intensive that unless their location happens to be particularly scenic, or in a tourist area, only the family woodworker will probably enjoy the time there.

Although some families do come along and camp nearby, Conover Workshops in rural, Amish-influenced Ohio, create a stimulating environment both night and day for the woodworker attending alone. Ernie and Susan Conover, along with their four children, plan the workshops so something's going on all the time. After a day spent building a Windsor chair, participants may for example, join for an evening tour of the Conover tool manufacturing facility or enjoy a picnic after a ride in a wagon drawn by Clydesdales.

Kirby Studios holds workshops at both its home base near Cumming, Georgia, and at a location just south of Astoria, Oregon. Instructor and top designer/craftsman Ian Kirby keeps his short-term woodworkers busy day and evening, too. His program allows participants to take advantage of additional hands-on experience and prepare for classes in his studio after the day's formal sessions are over.

Some workshops, you'll find, concentrate on a specific technique or aspect of woodworking. For example, Woodturning Workshops, held in Provo, Utah, draw turners who want to learn under special instructors such as Dale Nish, Richard Raffan, Ray Key, and Mel Linquist. Carvers gather for a week on the upper Mississippi River at Villa Maria Woodcarving Workshop, sponsored and taught by members of the Minnesota Woodcarvers Association.

While offering instruction in several technique-oriented woodworking subjects, workshops at the University of Northern Illinois have a common goal. Explains program head Dr. Roger Cliffe: "We try to

Continued

emphasize what the typical woodworker needs to know. We try to be practical and teach them what's going on in the field today." Past classes have covered the use of power tools, such as the table saw and router, or materials, such as plastic laminates.

Workshops with a highly specialized focus. These workshops zero in on often little-known woodworking techniques, philosophies, or specialized tools.

For example, if you're interested in Norwegian woodworking traditions, you'll want to head for Vesterheim, the Norwegian-American Museum. In a complex of historic buildings in Decorah, Iowa, American and Norwegian instructors teach the necessary skills for you to do acanthus (floral motif) carving, or to make bentwood boxes.

American history buffs learn the wood crafts of early settlers at the Augusta Heritage Arts Workshop. Their hands-on seminars unlock the secrets of carving treenware and building log cabins.

The appeal of Japanese tools and woodworking techniques has grown among American woodworkers in the last few years. If they appeal to you, too, you might want to attend the Japanese Masters' Seminar sponsored annually by Masterpiece Tools. There, you'll learn directly from Japanese masters (with the help of interpreters). And, rather than work in a shop, you'll enjoy the outdoor setting of New Hampshire's Bear Brook State Park.

Perhaps the oldest, and by now the largest, specialized workshop is hosted by a U.S. tool manufacturer. Shopsmith, Inc., holds three-day seminars at their 14 retail stores around the country. Designed primarily for new and prospective owners of the Mark V multipurpose tool, these seminars teach you how to perform all key operations on this all-on-one-machine workshop. And, after you learn the basics, you can move on to their cabinetmaking class.

One- or two-student instruction. Private or semiprivate classes give you the instructor's full attention plus allow you to tailor the instruction to match your experience and pace. Russ Zimmerman, for instance, teaches woodturning to no more than two students at a time in his Vermont workshop. "I have found that with only two students I'm able to focus on their different interests and skill levels in a given amount of time," Russ explains.

In Mississauga, Ontario (close to Toronto), Bert Thompson carries on a tradition of woodturning begun by his family in 1850. Though he offers private lessons in his own workshop, he will also travel to students.

Want to travel overseas and learn, too? Vacation in the United Kingdom with John Sainsbury, a liveryman of the Worshipful Company of Turners of London and author of many woodworking books. John takes two students at a time for from two to 14 days.

The instructor makes the course

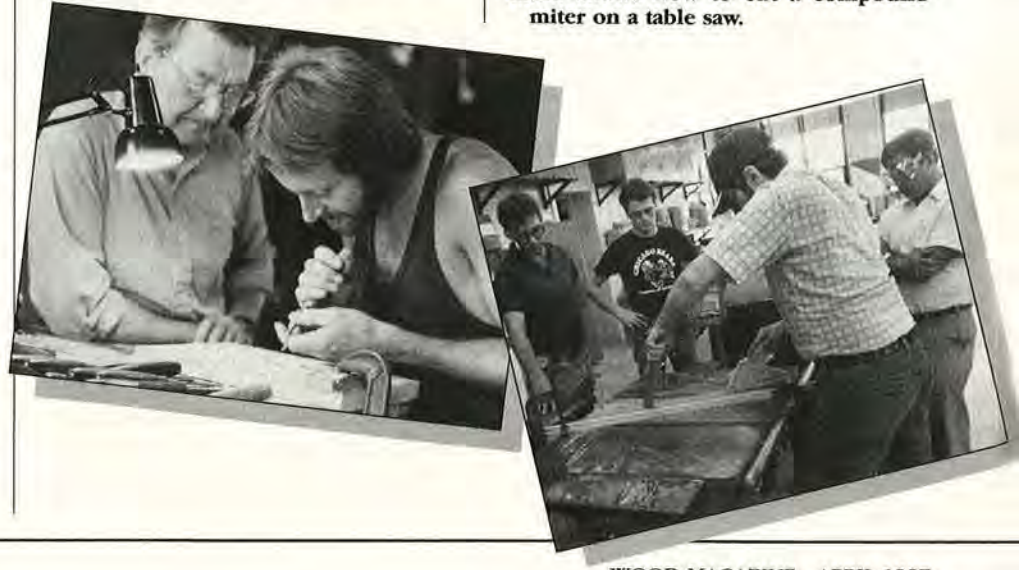
More times than not, your workshop teacher determines how much you'll enjoy and benefit from a program. Generally, workshop instructors fall into one of two categories: nationally known craftsmen, or teachers who are also craftsmen. Some may be both.

How, then, can you be sure you'll like the course given by a particular instructor? Here's some suggestions:

- During the summer months well-known craftsmen often teach at more than one workshop. Noted craftsmen such as Rude Osolnik, Michael Dunbar, James Krenov, Sam Maloof, David Ellsworth, Ian Kirby, Dale Nish, and Tage Frid — to name but a few — are popular and frequently appear on programs. These "circuit riders" also hold short seminars at woodworking shows and tool stores around the country all through the year. If you can, take in one to get a feel for the person's approach to teaching woodworking.
- If you can't "try out" an instructor or talk to someone who has attended one of his classes, write to the workshop or instructor and ask for references. Or call direct; often you can speak with the instructor personally.
- Darrel Nish of Craft Supplies USA, sponsor of Provo's Woodturning Workshops says (referring to well-known craftsmen): "Pick one whose work and technique, or area of expertise, matches your interest."

Harald Kolstad, from Manger, Norway, demonstrates acanthus carving during a crafts workshop at the Norwegian-American museum in Decorah, Iowa.

In a weekend workshop at Northern Illinois University, instructor Dr. Roger Cliffe shows how to cut a compound miter on a table saw.



Sort out the details: fees, lodging, meals, tools, and wood

Eventually one does have to consider the cost. Besides the basic fees workshops charge, you'll probably have some not-so-obvious expenses. To find the bottom line, ask: What exactly does the fee cover? And, what will I have to buy or provide?

Basic fees. Double-check to see what the basic fee covers. In some workshops it covers only instruction. Some include lunch, snacks, and materials, too. Workshop literature often itemizes every cost. When it doesn't, you'll have to do some additional figuring.

Lodging and meals. In workshops held on campuses, you may be able to eat and sleep in dormitories at reasonable prices. Those without on-site accommodations often will help you find bed-and-breakfast facilities or motels.

If you study with woodturner Russ Zimmerman, you're welcome to stay in his home. At the Japanese Masters' Seminar, there's free camping in the pine forest.

Hand tools. Most workshops expect you to bring your own hand tools. If you can't for some reason, you usually can use ones in the classroom. In a few cases, you'll be asked to rent a set.

Wood. The wood you practice on in class exercises may be covered in either the instruction fee or through a lab fee that typically runs between $15 and $25. For projects, you're expected to bring your own wood, buy wood at the workshop, or pay a higher lab fee, ranging anywhere from $30 to $50 or even $100.

Advance deposit. Many schools require a deposit or partial payment of the fee before they'll confirm your reservation. A few also ask for a registration or processing fee.

Once you have decided on the workshop you want to attend, total all the fees and expected expenses to see what a hobby vacation will cost. Fees vary so much from workshop to workshop that weighing one against another on money alone becomes an impossible task. But once you make the decision, start the paperwork to get in.

Workshop acceptance. All workshops we contacted limit class size to a maximum of anywhere from five to 20 participants. That means *register early!*

A few schools, especially those with a strong artist/craftsperson orientation, select workshop students from each year's batch of applicants. Apply to Haystack Mountain School of Crafts, in Maine, for instance, and you'll be asked to write a "statement of intent" to submit along with your application. That weeds out the not-so-serious, but it doesn't eliminate beginners. They seek a balance of experience levels.

Course credit. If you'd like to work on a degree, many programs can be taken for undergraduate or graduate college credit.

Advice to workshop participants

Don't get hung up on building things; build your knowledge instead. Darrel Nish of Woodturning Workshops says, "Most people could better spend their time working on techniques being taught. They can always finish their project at home."

Even though a completed project may seem to be the workshop's goal, the techniques you learn in order to build that project are far more important to you in the long run. Take, for example, Michael Dunbar's Windsor Chair class at Conover Workshops. By the last day, each participant has a chair. Along the way, the class learns to steam bend, whittle a chair seat, work with many hand tools, set a plane, and turn on a lathe.

Now turn to page 86 for a listing of workshops and what they have to offer, as well as approximate prices.

Master instrument builder Wayne Henderson outlines the fine points of guitar construction to a summer student at Augusta Heritage Arts Workshop in West Virginia.

Cutting a cove using an inclined fence and a featherboard being demonstrated at Northern Illinois University. Workshop focuses on power tools and techniques.

Written by Emily Freeman Pinkston

Photographs: *In order,* Anderson Ranch Arts Center, Arrowmont School of Arts and Crafts, Brookfield Craft Center, Norwegian-American Museum, Northern Illinois University, Doug Yarrow for Augusta Heritage Arts Workshop, Northern Illinois University

CLASSIC CHERRY

Print this article

If you can build a basic cabinet, you can tackle this handsome traditionally styled furniture project. And you're not going to believe how easily the mock-louver doors go together. We've developed a new technique that makes cutting these louvers a breeze, without complicated jigs or expensive tools.

NIGHTSTAND WITH MOCK-LOUVER DOORS

LET'S START WITH THE BASIC CABINET

1 Using ¾" cherry plywood, rip and crosscut the sides (A), top (B), and bottom and drawer shelf (C) to the sizes listed in the Bill of Materials on page 77. Cut the hardboard back (D) to size.

2 Cut or rout a ¾" rabbet ⅜" deep along the bottom and a ¾" dado ⅜" deep 5⅛" from the top end of each side panel where shown on the Basic-Cabinet Drawing, page 76. Using the same blade setup, cut a ¾" rabbet ⅜" deep along both ends of the top panel. Next, cut or rout a ¼" rabbet ⅜" deep along the back edge of the top piece and along the back edge of each side panel for the back.

3 Dry-clamp the cabinet together to check the fit. Glue and clamp the plywood pieces together, checking for square. Fit the hardboard back into place, and drill shank and pilot holes through it and into the plywood, using the hole sizes noted on the drawing. Screw, but do *not* glue the back to the cabinet.

ADDING THE TRIM

1 Cut the top rail (E) to size. Glue and clamp the top rail to the bottom side of the top, with the front edge of the top rail protruding ¾" (see the Basic-Cabinet Drawing).

2 Cut the drawer kicker (F) to size. Remove the hardboard back from the cabinet, and glue and clamp the kicker in position centered from side to side and flush with the back edge of the top rail (E). (The kicker keeps the drawer level when it's being pulled out.)

3 Cut the front trim pieces (G, H) to size, making sure to cut the two G pieces the same length as the top rail. Glue and clamp the front trim pieces to the cabinet.

4 Cut a piece of ¾" cherry to 2x21" for the side trim pieces (I) and a piece 1x24" for the front trim piece (J). Mount an edge-rounding bit in your table-mounted router (see the Buying Guide for a source for the bit). Position the router table fence and bit as shown on the Detail Drawing on the Trim and Base Drawing, and rout *one* edge of the front trim piece and *both* edges of the side trim piece. Using a push stick, rip the two side trim pieces to finished width from the 2"-wide piece. Then, cut all three pieces to length, and glue and clamp them to the cabinet top.

5 Sand the ends of the front trim piece to match the routed contour of the mating sides pieces. Sand the cabinet smooth.

BUILDING THE BASE

1 Cut the base sides (K) and front (L) to size plus 1" in length from ¾" cherry. Cut the back (M) to size. Cut or rout a 3/16" rabbet 3/16" deep along the top outside edge of the sides and front.

2 Miter-cut the sides and front to length. Then, miter-cut the four corner braces (N) to size.

3 Glue and clamp the base together (we used band clamps), checking for tight miter joints and for square. Later, position a corner brace (N) in each corner, flush with the top edge of the base, and drill the shank and pilot holes to the sizes noted on the Trim and Base Drawing. Now, glue and screw the corner braces in position, flush with the top edge.

4 Turn the cabinet upside down (we laid a blanket under ours to avoid scratching the veneer top), and align the base (also upside down) on the cabinet. Drill shank and pilot holes and screw the base to the cabinet.

NOW, ON TO THE DRAWER

1 From ½" cherry, rip and crosscut the drawer front (O), sides (P), and back (Q) to the sizes listed in the Bill of Materials on page 77. Next, cut the hardboard bottom (R) to size. Cut the drawer guides (S) to size, and radius the front end of each.

2 Into each drawer side, cut or rout a ½" rabbet ¼" deep at the front. Now, cut or rout a ½" dado ¼" deep 3½" from the back end (see the Drawer Drawing on the following page). Finally, cut or rout a ¼" groove ¼" deep ½" from the bottom edge in the drawer front and sides. Dry-clamp the pieces together to check the fit.

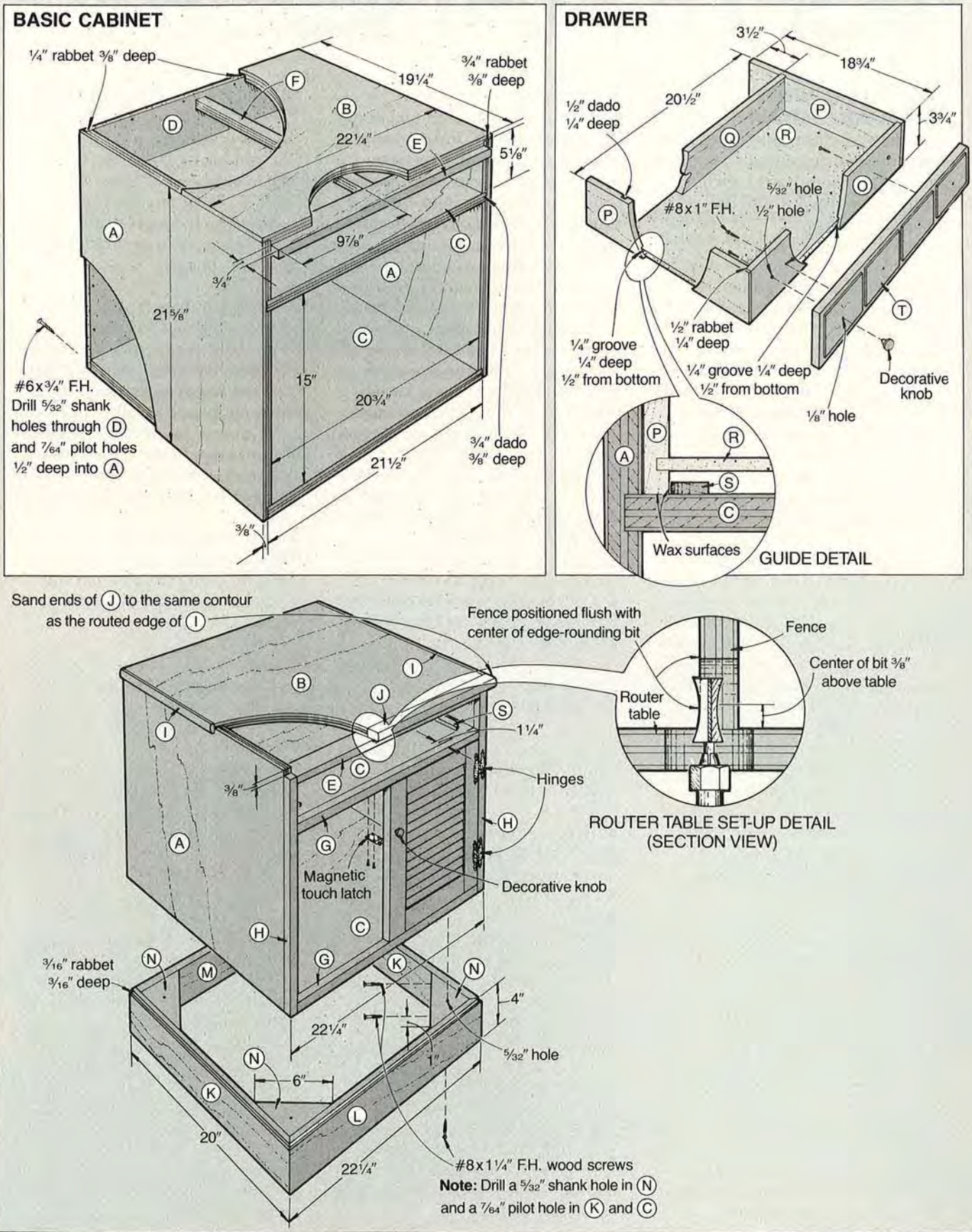
3 Glue and clamp the drawer together, checking for square. Do not glue the bottom (R) in the ¼" groove, instead; secure it to the back (Q) with ¾" brads.

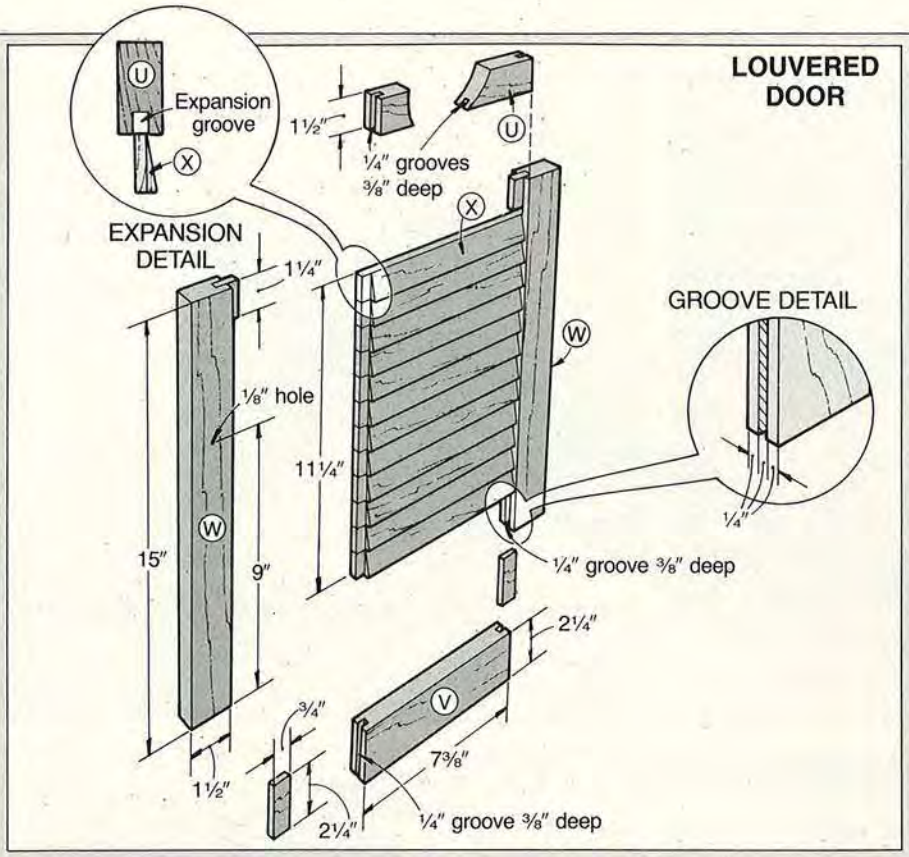
4 Apply a liberal amount of wax (we used paraffin) to the bottom and bottom inside edge of each cherry drawer side. The wax prevents the glue used to attach the drawer guides in the *next* step from sticking to the drawer sides. Install the drawer, centered from side to side and flush with the front edge of the drawer shelf (C).

5 To position the two drawer guides (S), spread a thin, even coat of glue on the bottom surface of each guide. Then, working from the back of the cabinet, position the guides on the top of the drawer shelf, butting them against the back of the drawer front and flush against the waxed insides of the drawer sides (P) where shown in the Guide Detail. (Be careful when positioning the drawer guides not to move the drawer from its centered position.) Let the glue dry completely before removing the drawer.

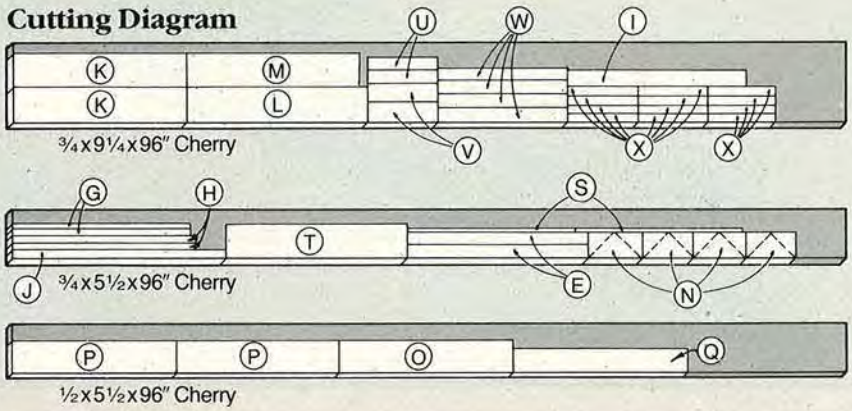
Continued

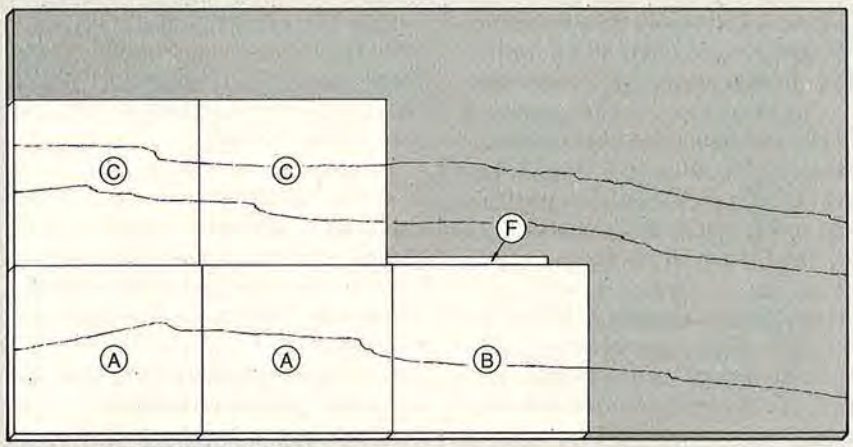
CLASSIC CHERRY NIGHTSTAND

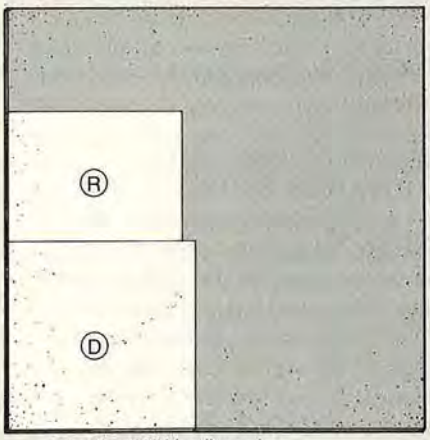




Cutting Diagram







Bill of Materials

Part	Finished Size* T	W	L	Material	Qty.
BASIC CABINET					
A	¾"	19¼"	21⅝"	cherry plywood	2
B	¾"	19¼"	22¼"	cherry plywood	1
C	¾"	19"	21½"	cherry plywood	2
D	¼"	21½"	21⅝"	hardboard	1
E	¾"	1½"	20¾"	cherry	1
F	¾"	1"	18¼"	cherry plywood	1
G	¾"	¾"	20¾"	cherry	2
H	¾"	¾"	21¼"	cherry	2
I*	¾"	¼"	19¼"	cherry	2
J*	¾"	1"	22¾"	cherry	1
BASE					
K*	¾"	4"	20"	cherry	2
L*	¾"	4"	22¼"	cherry	1
M	¾"	4"	20¾"	cherry	1
N	¾"	3"	6"	cherry	4
DRAWER PARTS					
O	½"	3¾"	20"	cherry	1
P	½"	3¾"	18¾"	cherry	2
Q	½"	3"	20"	cherry	1
R	¼"	15"	20"	hardboard	1
S*	¼"	¾"	18⅜"	cherry	2
T	¾"	3⅞"	20⅝"	cherry	1
DOORS					
U	¾"	1½"	7⅜"	cherry	2
V	¾"	2¼"	7⅜"	cherry	2
W	¾"	1½"	15"	cherry	4
X*	⅜"	15/16"	7⅞"	cherry	24

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Supplies: #8x1¼" flathead wood screws, #6x¾ flathead wood screws, ¾" brads, double-faced tape, paraffin wax, finish

Continued

CLASSIC CHERRY NIGHTSTAND

6 Cut the drawer face (T) to size. Using a table saw or a radial arm saw fitted with a dado blade, cut the dadoes and rabbets 1/8" deep where shown on the Drawer-Face Drawing on page 76.

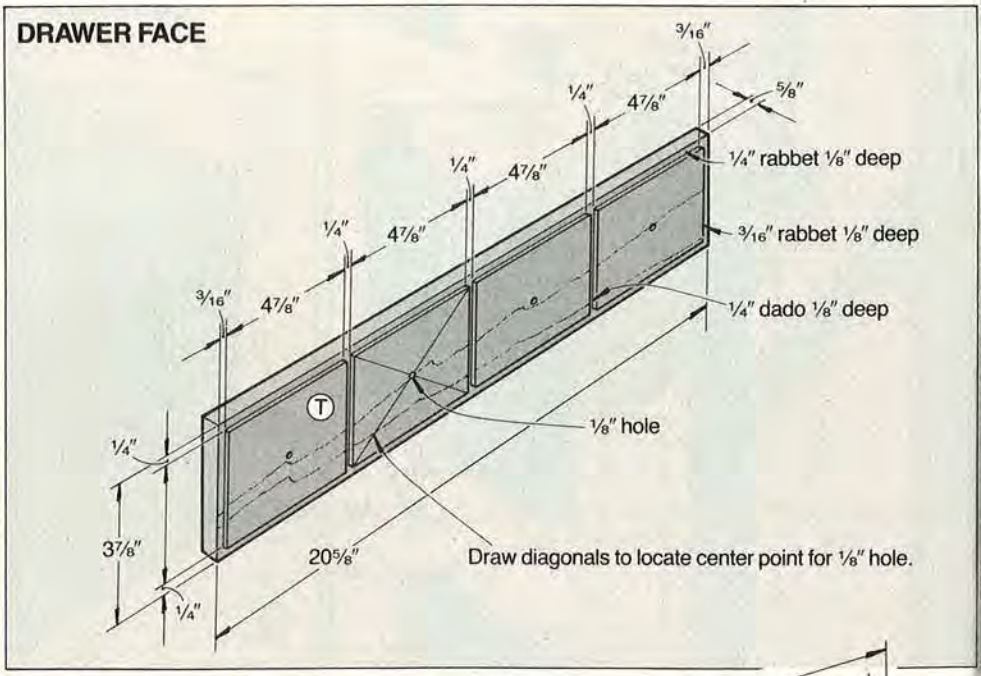
7 Place a piece of double-faced tape on the front face of the drawer front. Then, position the drawer face, centered from side to side and top to bottom (we taped a dime to each end and two on the bottom edge to help center the drawer face against the drawer front). When correctly positioned, press firmly against the taped drawer face. Carefully remove the drawer and taped-on face, and clamp the drawer face to the drawer to ensure it doesn't move. Drill the two 5/32" mounting holes through the back of the drawer front and into the back of the drawer face, then screw the drawer face to the drawer.

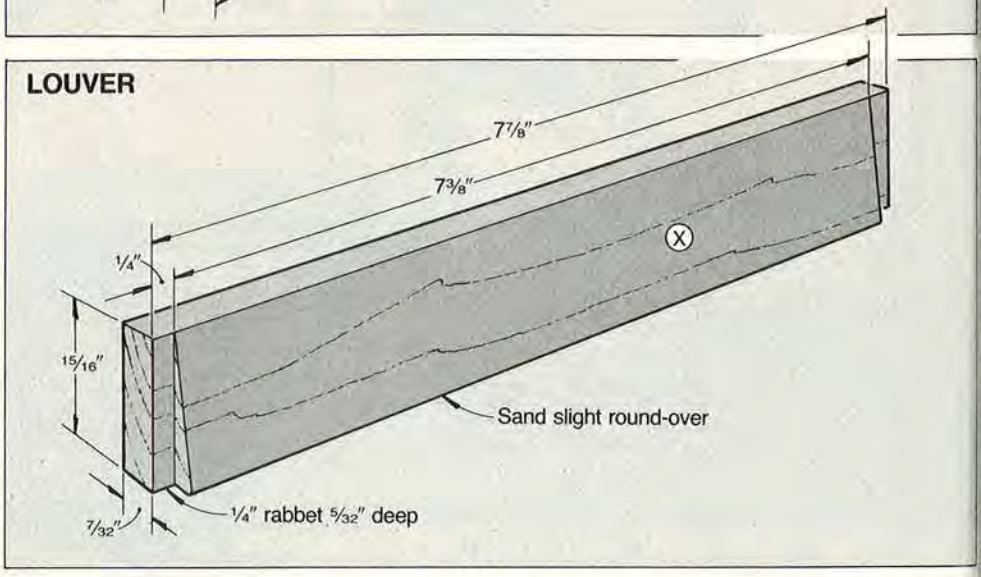
8 To locate the knob holes, draw diagonal lines across each of the four raised areas on the front of the drawer face. Then, drill a 1/8" hole at each center point through the drawer face first and continue drilling on through the drawer front. Using the 1/8" hole as a guide, drill a 1/2" hole 1/2" deep from the *back side* of the drawer front to house the knob screw that you will attach later (the knob screw is too short to go through the thickness of both the drawer front and drawer face).

9 Screw the hardboard back (D) in position.

AND NOW FOR THE LOUVERED DOORS

1 Cut the upper and lower door rails (U, V) and the stiles (W) to the sizes listed in the Bill of Materials. Cut or rout a 1/4" groove 3/8" deep centered along the bottom edge of the upper rails and the inside edge of the stiles where shown on the Louvered-Door Drawing and Detail, page 77.



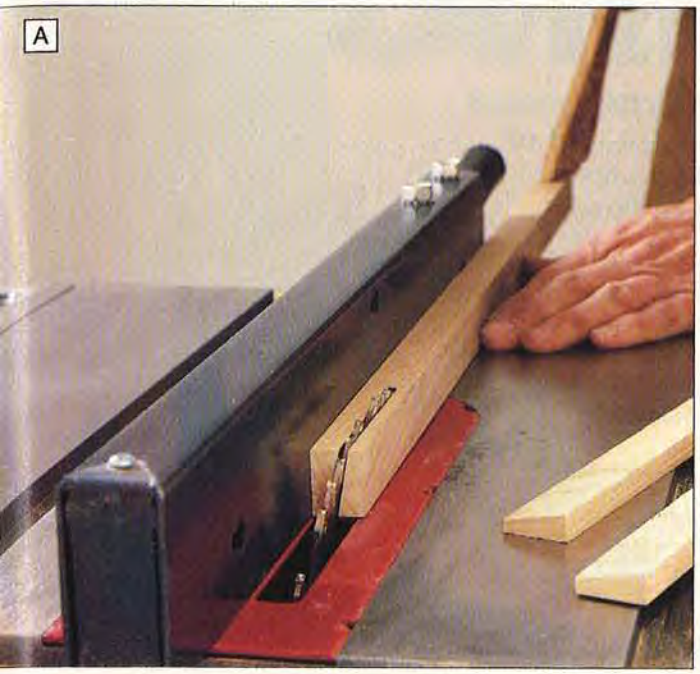


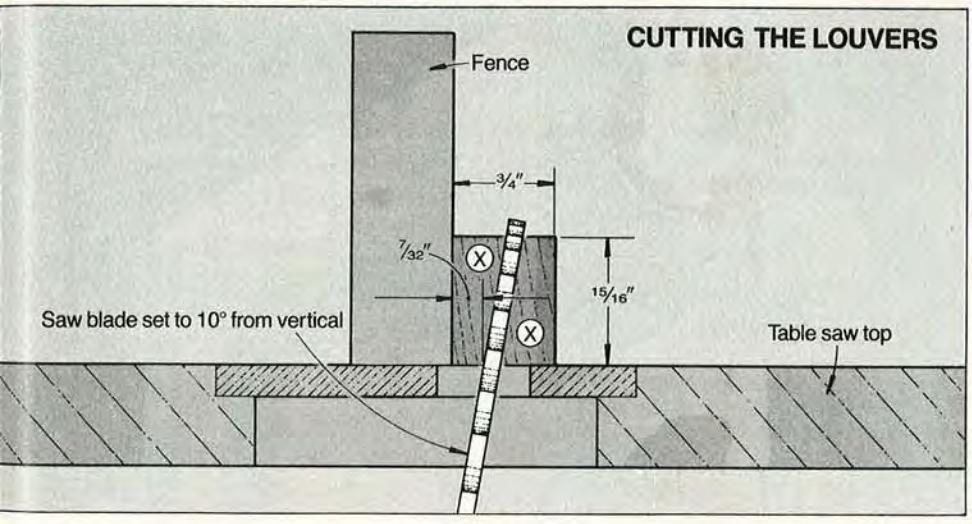
2 Using a follow block, cut or rout a 1/4" groove 3/8" deep along both ends of each upper and lower rail.

3 Plane or saw a thicker piece of cherry to 1/4" thick by 2 1/4 x 12" long. Then, cut the splines to the sizes and quantity listed on the Louvered-Door Drawing.

4 From 3/4" cherry, cut 4 pieces to 15/16 x 25". Tilt your table-saw blade 10° from vertical, and set the fence 7/32" from the bottom of the blade as shown on the Louver-Cutting Drawing. Now, bevel-rip each piece as shown in photo A (you'll get two long beveled strips from each blank). Crosscut three louvers (X) to length from each of the beveled strips.

5 Cut a 1/4" rabbet 5/32" deep along each end of each louver where shown on the Louver Drawing *above*. (As shown in photo B, we raised the dado blade mounted on our radial arm saw 7/32" above the saw table. Then, set a stop 7 5/8" from the blade and, with the beveled-face up, rabbet both ends of each louver.)





6 Finish-sand the louvers. It will save you time by sanding them now, rather than waiting until the doors are glued up.

7 Dry-clamp each door together to check the fit. Now, glue and clamp each door together, checking for square. Insert, but do not glue the louvers in the grooves; leave them free to float.

HANGING THE DOORS AND FINAL ASSEMBLY

1 To hang the doors, start by cutting or planing 1/16" off the bottom and hinge side of each door. Tape two dimes to the bottom of each door and two on the edge on which the hinges will be hung. Position the doors in the cabinet opening, and plane any edges as necessary to create equal clearances. Once both doors are properly centered, mark the hinge screw hole locations on the door stile (W) and cabinet stile (H). Remove the doors and drill the hinge holes.

2 Sand the cabinet, drawer, and doors smooth. Finish as desired (we used cherry stain and several coats of clear polyurethane). Reapply wax to the bottom of the drawer sides for smooth operation.

3 Hang the doors and add the knobs to the doors and drawer. Attach the magnetic touch latch to the bottom side of the drawer shelf (C), and fasten a strike plate to each door. (See the Buying Guide *below* for our source of hardware.)

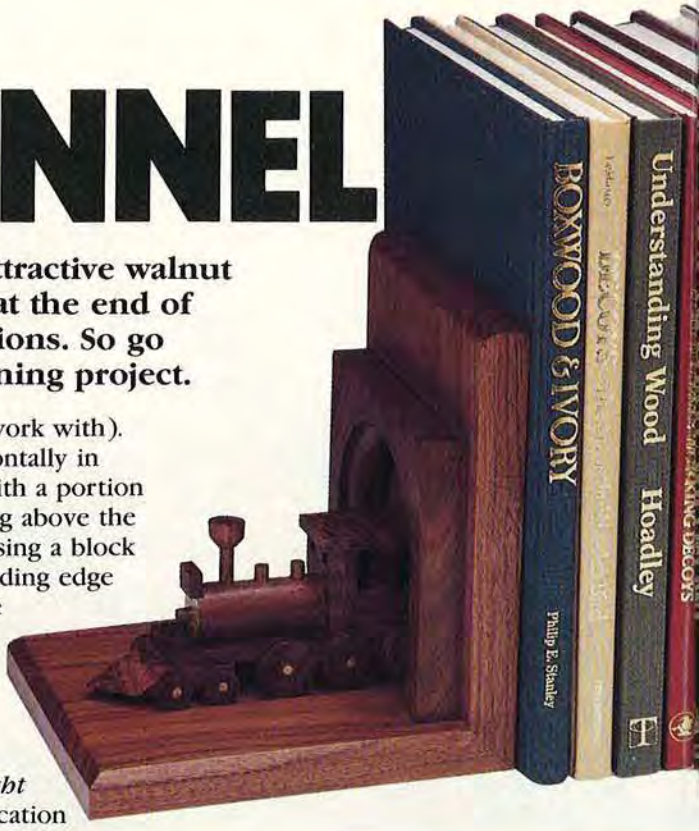
BUYING GUIDE

- **Edge-rounding bit.** High-speed steel router bit, catalog no. 9GT25586, $4.59. Available at Sears stores.
- **Door hardware.** Magnetic touch latch, double unit, two strike plates included, catalog no. ML772. "H" hinges, hammered steel, dull black, catalog no. 175C48, (2 pairs needed). Knobs, 1" diameter, dull black, catalog no. 175C45 (six needed). $17.10 for the package, postage paid. Constantine's, 2050 Eastchester Road, Bronx, NY 10461, or call 800/223-8087 (800/822-1202 in New York) to order.

Project Design: James R. Downing
Photographs: Bob Calmer
Illustrations: Kim Downing; Bill Zaun

TRAIN-TUNNEL

Take a ride on the Reading Railroad with our attractive walnut bookends. You'll immediately find the light at the end of the tunnel with our easy-to-follow instructions. So go directly to step 1, and lay the tracks to a winning project.



Note: *You'll need ¼" walnut for this project. You can either resaw or plane thicker stock to the correct thickness, or special-order it. See the Buying Guide on page 98 for our source.*

BUILDING THE BASES

1 Cut four pieces of ¾" walnut to 6½x7½" long for the bottoms and uprights (A). Tilt your saw blade to 45° from center, and bevel-cut one end of each to 7¼" length.

2 Dry-clamp the uprights to the bottoms (we used miter clamps), and check for square. Using the hole sizes shown on the Base Drawing, drill a pair of shank and pilot holes through each mitered joint. Remove the clamps and apply glue to the mitered edges. Now, clamp the base pieces together and drive the screws, again checking for square. Later, remove the clamps and sand smooth.

3 To make the tunnel pieces (B), cut two pieces to the size listed in the Bill of Materials. Using the dimensions on the Base Drawing, lay out the arched opening on both pieces. Using a band saw or jigsaw, cut the opening to shape, and sand the cut edge smooth.

4 Using a ½" round-over bit, rout a bead along the front inside edge of the tunnel opening as illustrated in the Bead Detail.

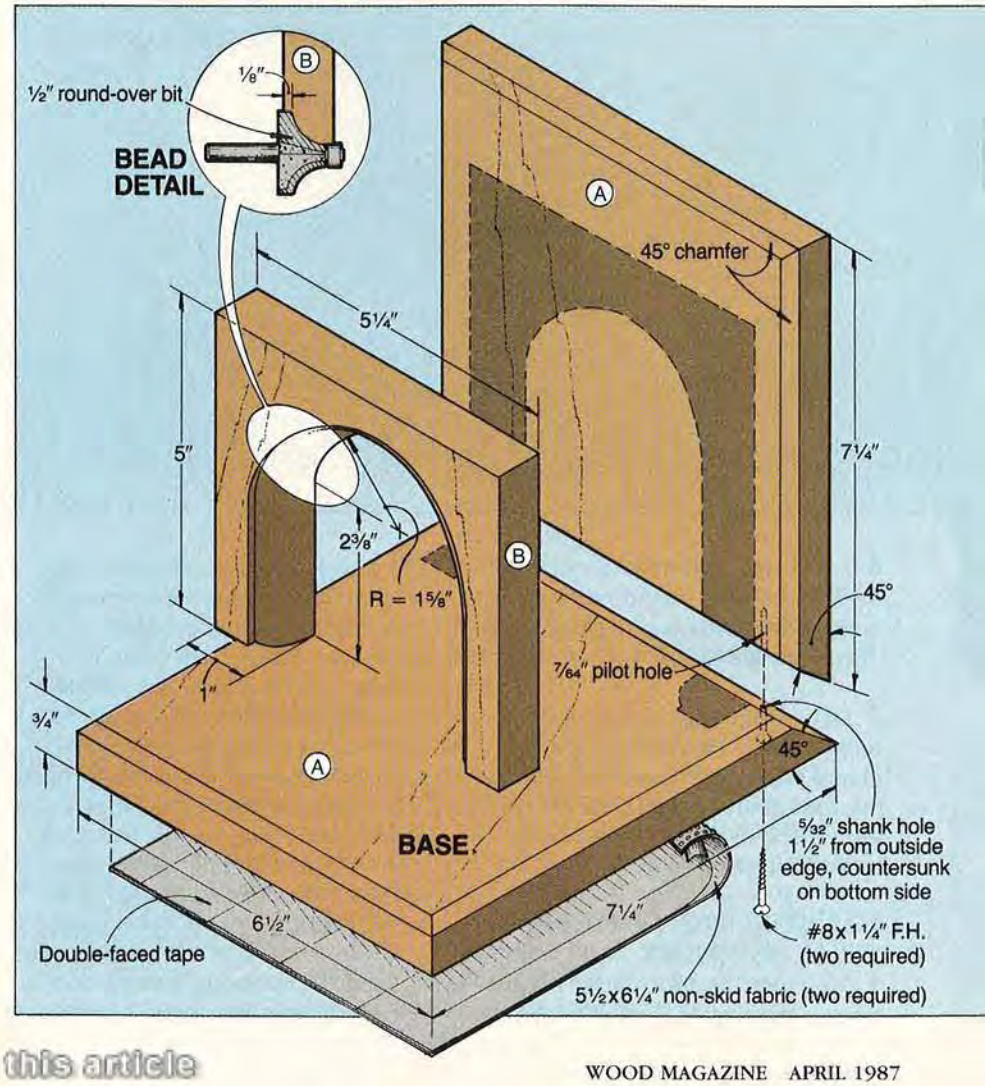
5 Fit your table-mounted router with a chamfer bit, and rout the edges of each base where shown on the Base Drawing. Now, glue and clamp a tunnel piece to each base, centered from side to side.

NOW FOR THE LOCOMOTIVE

Fashioning the Boiler

1 To make the boiler (C), start by cutting a 1"-diameter walnut dowel 6" long (a piece longer than 2¼" will be easier to work with). Clamp the piece horizontally in a woodworker's vise with a portion of the dowel protruding above the top edge of the vise. Using a block plane, plane the protruding edge until the planed surface measures exactly ⅝" wide along the entire length of the walnut dowel.

2 Using the Locomotive Drawing *below right* as a guide, mark the location



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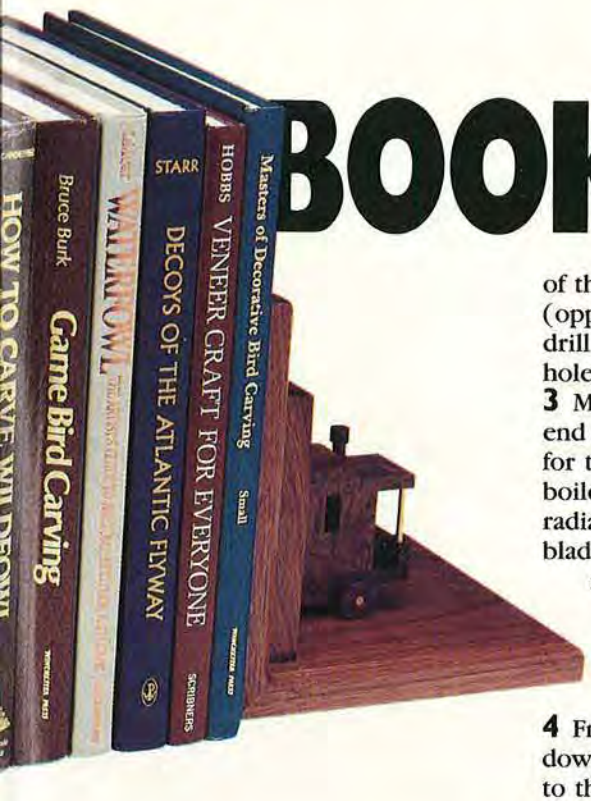
BOOKENDS



of the three smokestack holes (opposite the planed edge). With a drill press, drill the ¼" smokestack holes where marked.

3 Mark the ⅛" notch on the front end of the dowel. To cut the notch for the headlamp (D), hold the boiler against the fence of your radial arm saw. Now, raise the saw blade ¾" above the surface of the radial arm saw table, and cut a ⅛"-wide notch where marked on the boiler front. Cut the boiler to final length (2¼").

4 From a ¼"-diameter walnut dowel, cut the three smokestacks to the lengths given on the drawing. Glue the smokestacks into the ¼" holes in the boiler, placing the tallest at the front.

5 To make the top of the smokestack, cut a piece of ⅝" dowel ½" long. Clamp the piece in a hand screw and drill a ¼" hole through its center. Place the smokestack top on one end of a 6" length of ¼" dowel, and chamfer one end of the ⅝" dowel with a belt sander as shown in photo A. Remove the smokestack top from the dowel, and glue it to the top ¼" of the tallest smokestack.

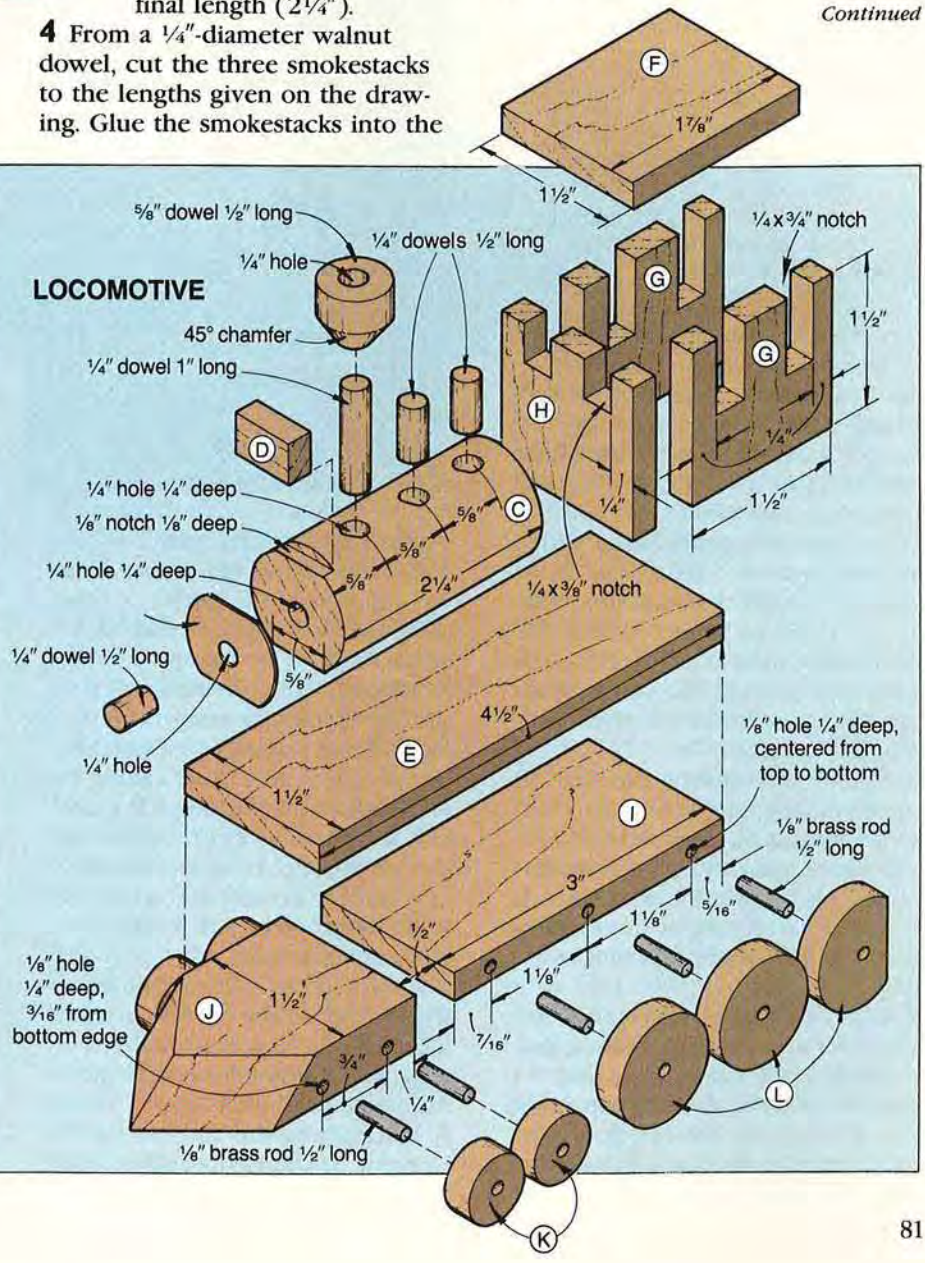
Continued

Bill of Materials

Part	Finished Size* T	W	L	Material	Qty.
Bases					
A*	¾"	6½"	7¼"	walnut	4
B	¾"	5¼"	5"	walnut	2
Locomotive					
C*	1" diameter		2¼"	walnut dowel	1
D	¼"	7/16"	⅝"	walnut	1
E	¼"	1½"	4½"	walnut	1
F	¼"	1½"	1⅞"	walnut	1
G*	¼"	1½"	1½"	walnut	2
H*	¼"	1½"	1½"	walnut	1
I	¼"	1½"	3"	walnut	1
J*	½"	1½"	2⅜"	walnut	1
K*	¼"	⅝" diameter		walnut	4
L*	¼"	1" diameter		walnut	6

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Supplies: ¼", 3/8", ⅝", and 1" walnut dowel, #8x1¼" flathead woodscrews, .010" sheet brass, ⅛" brass rod, epoxy, masking tape, double-faced tape, aerosol polyurethane, non-skid fabric (we used Safe Treds — the fabric used on the feet of children's pajamas — which is available at most hobby stores).



TRAIN-TUNNEL BOOKENDS

6 Lay a piece of .010"-thick brass (sold at most hobby stores) on a flat surface, and set the boiler on it vertically. Trace the outline of the boiler's front onto the brass. Cut brass to shape with a scissors, and epoxy the brass to the boiler's front. File the edges of the brass flush with the edges of the boiler. Later, finish-sand the boiler.

7 Draw diagonals on the brass boiler front to locate its center. Then, drill a ¼" hole ¼" deep at the center point. Cut a piece of ¼" walnut dowel to ½" long and glue it into the hole. Cut the headlamp (D) to size, and glue and clamp it in the ⅛" notch at the front of the boiler. (We used masking tape as our clamp.)

Constructing the Cab

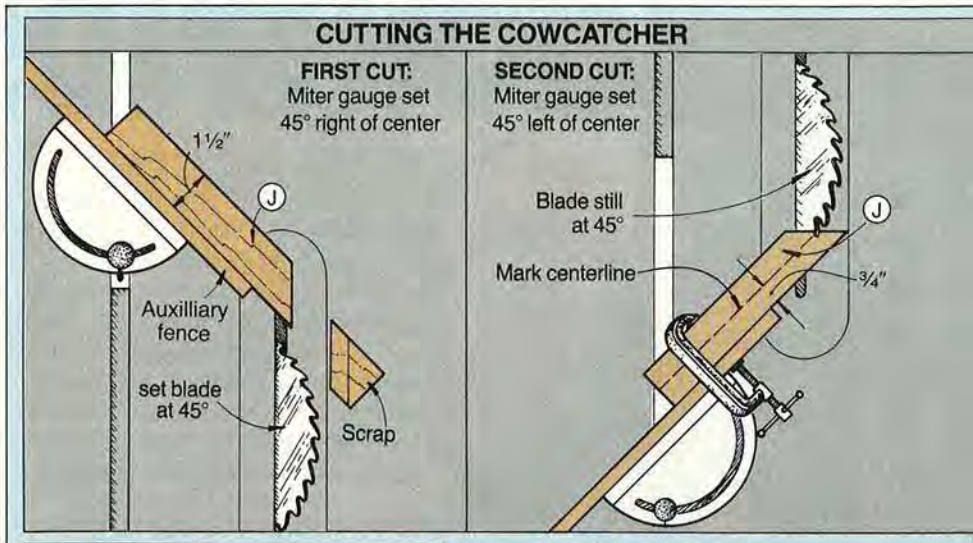
1 Cut the cab floor (E) and top (F) to size from ¼" walnut. Cut the cab sides (G), and front (H) to size plus 4" in length (you need this extra length to safely handle the wood while cutting the windows).

2 Using the dimensions on the Locomotive Drawing, mark the location of the window notches on the cab front and sides. Set up a dado blade in your table saw to cut ¼" wide. Then, raise the blade until the top is ¾" above the surface of the saw table.

Using a miter gauge fitted with an auxiliary wood fence, cut the windows in the two side pieces as shown in photo B. Now, lower the dado blade until it is ⅜" above the saw table, and cut the windows in the front piece. Cut the pieces to finished length.

3 Glue and clamp the cab sides to the front, keeping the top and bottom edges flush. Later, scrape off the excess glue and sand smooth. Glue and clamp the top to the cab, with a ⅛" overhang at the front. Remove the clamps and finish-sand the cab.

4 Glue and clamp the cab to the cab floor (make sure the back and side edges are flush). Glue and clamp the boiler to the front of the cab centered on the cab floor. Remove excess glue and sand smooth.



Bill of Materials

Part	Finished Size* T	W	L	Material	Qty.
Caboose					
M	¼"	1½"	4"	walnut	2
N	¼"	1½"	3¼"	walnut	1
O	¼"	1½"	2¾"	walnut	1
P*	¼"	3"	1½"	walnut	2
Q*	¼"	1½"	1½"	walnut	1
R	¼"	⅜"	1½"	walnut	1
S*	¼"	¾" diameter		walnut	4

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Supplies: see locomotive supplies

Forming the Chassis

1 Cut the chassis (I) to size. Glue and clamp it to the bottom of the cab floor, with the side and back edges flush.

2 To make the cowcatcher (J), start by planing or resawing a piece of ¾" walnut to ½" thick. Cut the piece to 1½x6". Using the set-up shown in Cutting the Cowcatcher Drawing, cut the front of the cowcatcher to shape. Finally, crosscut the cowcatcher to finished length (2⅜"). Sand the cowcatcher smooth.

3 Glue and clamp the cowcatcher to the front of the cab floor, leaving a ½" gap between the back edge of the cowcatcher and the front edge of the chassis.

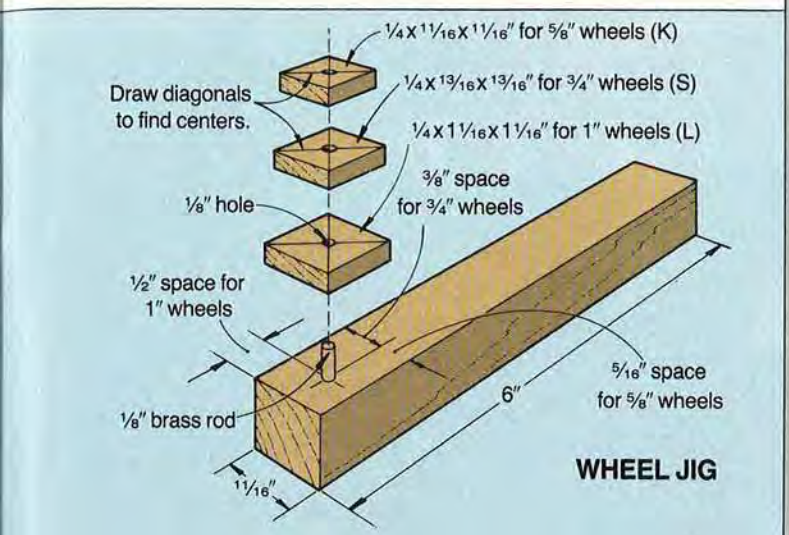
4 Referring to the Locomotive Drawing, mark the location of the axle holes on the chassis and cowcatcher. Now, drill the ⅛" holes ¼" deep where marked.

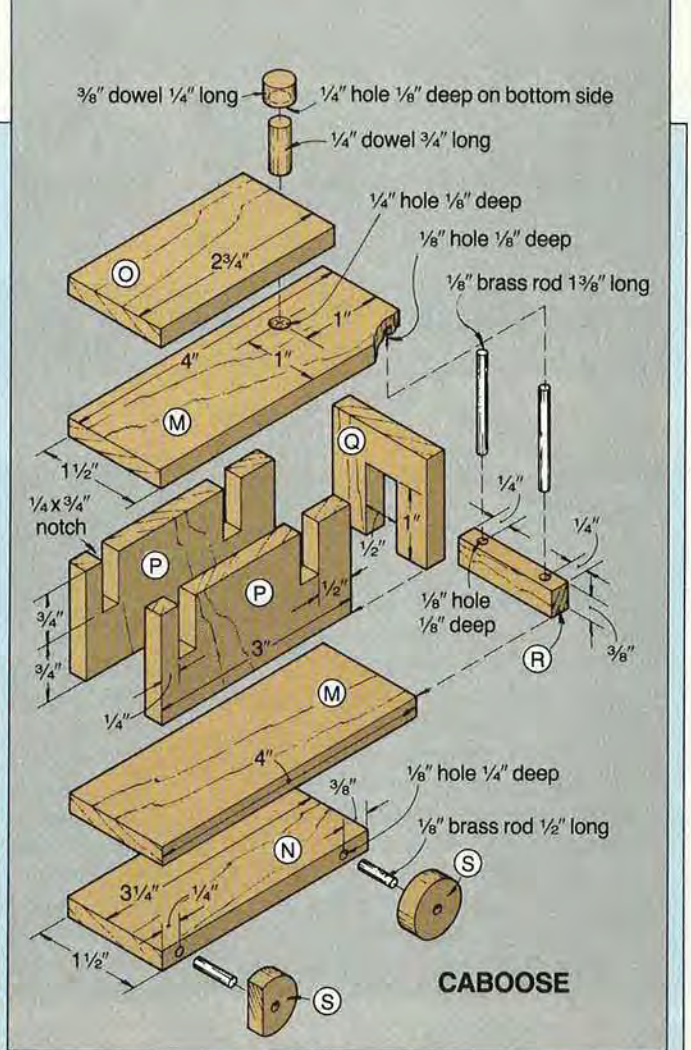
Making the Wheels

1 To make the locomotive wheels, start by cutting four 1 1/16" squares for the ⅝"-diameter wheels (K), six 1 1/16" squares for the 1"-diameter wheels (L), and four 1 3/16" squares for the caboose wheels from ¼" walnut. (As a precaution, you may want to cut a few extra wheel blanks of each size, and then choose the best ones to use after sanding them to shape.)

2 Draw diagonals to locate the center of each walnut square. Using your drill press and holding one square at a time with a hand screw, drill ⅛" holes through the marked center point of each square. Back the wheel blanks with scrap to prevent chip-out.

3 Build the jig shown on the Wheel-Jig Drawing. Clamp the jig to your belt sander stand as shown


¼x1 1/16x1 1/16" for 5/8" wheels (K)
Draw diagonals to find centers.
¼x13/16x13/16" for ¾" wheels (S)
¼x1 1/16x1 1/16" for 1" wheels (L)
⅛" hole
⅜" space for ¾" wheels
½" space for 1" wheels
5/16" space for 5/8" wheels
⅛" brass rod
6"
1 1/16"
WHEEL JIG



in photo C, with the *end* of the jig next to the sanding belt. Position a 1 1/16" wheel "square" on the ⅛" brass rod, with a flat edge against the sander. Start the sander, and slowly rotate the square to sand it to a circular shape (it takes several rotations). Be careful not to sand the tips of your fingers in the process. Sand all six rear locomotive wheels (L) to shape.

4 Reposition the jig with the *side* edge (5/16"-spaced hole) against the belt and sand the front wheels (K) to shape. Reposition the jig (⅜"-spaced hole) and sand the caboose wheels (S).

5 Cut 14 pieces of ⅛" brass rod ½" long with a hacksaw (you'll use four of them later for the caboose). Apply epoxy to the inside of each wheel hole and insert the brass axles. Wipe off any excess epoxy immediately. Later, sand the surface of each wheel that will be visible when the wheels are attached to the chassis.

6 Epoxy the wheel and axle assemblies to the chassis and cowcatcher. Remove excess epoxy.

7 Sand the rear wheels flush with the back of the locomotive (we used the same belt sander and stand used to shape the wheels).

AT LAST — THE CABOOSE

Note: *To make the caboose you'll be using machining and construction techniques similar to those used to make the locomotive.*

1 Cut the caboose floor and roof (M), chassis (N), and cupola (O) to the sizes listed in the Bill of Materials. Cut the sides (P) and back (Q) to size plus 4" in length. Finally, cut the foot rail (R) to size.

2 Using the dado blade and setup shown in photo B, cut the window notches in the side pieces and the door in the back piece to the sizes shown on the Caboose Drawing *above*. Cut the walnut sides and back to finished size.

3 Drill a ¼" hole ⅛" deep in the top of the roof where dimensioned on the Caboose Drawing. Using a handsaw, cut a ¼" dowel ¾" long for the chimney, and a ¼" length of ⅜" dowel for the chimney cap. Drill a ¼" hole ⅛" deep in the chimney cap. Glue the cap onto the chimney.

4 Drill two ⅛" holes ⅛" deep in the foot rail (R), ¼" in from each end. Then, drill a pair of matching holes in the bottom side of the roof. Cut two pieces of ⅛" brass rod 1⅜" long.

5 Glue and clamp the caboose sides and back together, keeping the top and bottom edges flush. Later, glue and clamp the side, back, and foot rail to the caboose floor (M). After the glue has dried, insert the ⅛" brass rods in the foot rail, position the roof over the pieces, and glue and clamp it in place. Remove clamps and sand.

6 Glue and clamp the chassis (N) flush with the front end of the

Continued on page 98

RUBBER BAND-POWERED DRAGSTER

Print this article

Watch the gleam in your child's eye when this snappy little dragster zips across the kitchen floor. Our full-sized pattern makes it easy to build from scrap lumber. Just a few turns of the rear wheels wind it up for the green light.

1 From ½" stock (we used maple), cut a piece 2x6" for the chassis (A). Using carbon paper, transfer the full-sized chassis pattern on *page 97* onto the stock. Mark the location of the front- and rear-axle holes, and the center points for the flag and motor pin. Using a drill press and a 9/32" bit, drill the front and rear axle holes square with the chassis. Switch to a ¼" bit and drill the flag and motor pin holes 15° from vertical. (We simply "eye-balled" the angles when drilling.) Cut the chassis to shape and finish-sand.

2 To make the "slicks" (B), cut two pieces of ½" maple to 3x10". Laminate the pieces together face to face. Using a drill press and a 2" hole saw, cut out the two rear wheels. Switch to a 1" hole saw, and cut two front wheels (C) from ½" stock.

3 Mount a length of ¼" dowel in the drill press, and slide a wheel onto the dowel. Start the drill press and sand the wheel smooth, putting a slight round-over on the edges. Repeat for the other three wheels.

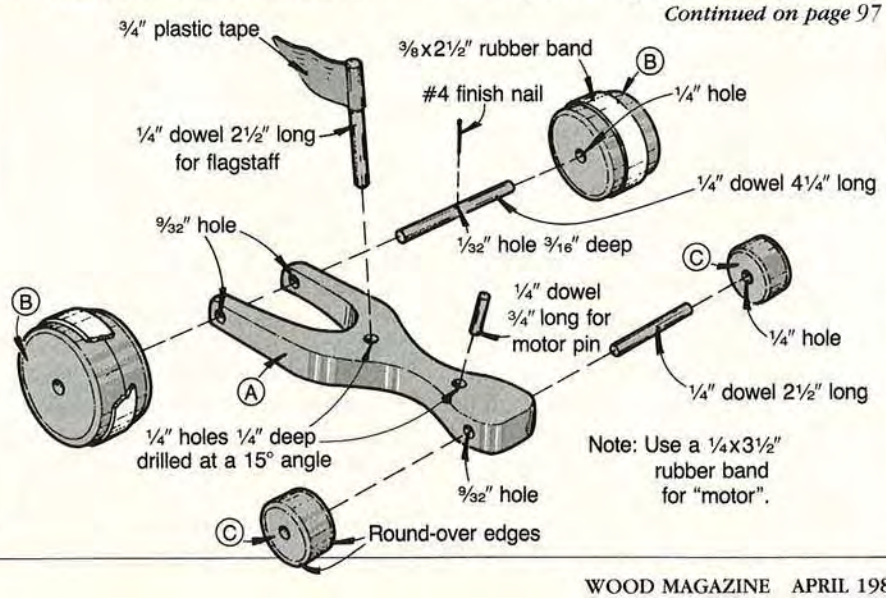
4 From ¼" dowel stock, cut the front and rear axles, flagstaff, and motor pin to the lengths indicated on the drawing. Drill a 1/32" hole 3/16" deep in the center of the rear axle.

5 Glue one rear wheel onto the rear axle and one front wheel onto the front axle. Insert the axles through the body. Then, glue the other wheels to the appropriate axles, and glue the motor pin and flagstaff in place.

6 Grind the tip of a #4 finish nail until it measures ⅝" long. Apply a small amount of epoxy to the tip of the nail; then gently tap it into the hole in the rear axle.

7 Cut a 4" strip of ¾" wide colored plastic tape for the flag, wrap

Continued on page 97



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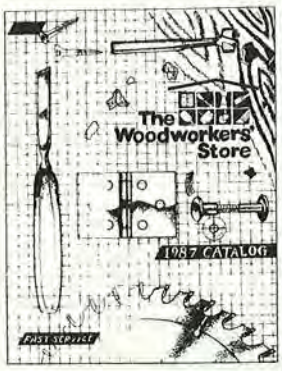

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TAKE A HOBBY VACATION

Print this article

WHERE TO TAKE A HOBBY VACATION

After you have decided exactly what type of course or workshop you want to attend, start writing for information, since most workshops start to fill early. The following list identifies facilities we found across the nation that offer short-term sessions from spring through fall. Because some information was not available at press time, we sometimes use 1986 price information, but indicate it as such. We use the following abbreviations and symbols to describe the workshops:

Abbreviations:

Length
wk = week d = day

Course levels offered
b = beginner i = intermediate a = advanced

Tuition plus additional lab fees
+ lab

Symbols:

woodworking taught as one of several craft workshops

Lunch or all meals provided

No lodging provided

Campgrounds in area

WEST

Anderson Ranch Arts Center, Box 5598, Snowmass Village, CO 81615; 303/923-3181.
When: 5-d, 10-d; June 1 - Aug. 21.
Cost: $150/2-d; $195/5-d; $295/10-d; children's courses, $60-$110/5-d; + lab.
Courses: b,i,a. Furniture design to construction.
Comments: Consistently attracts top instructors. A place for woodworking/craft-oriented families to find workshops for all. Log-cabin ranch in a valley near resort-oriented Aspen.

Fine Woodworking Program, College of the Redwoods, 440 Alger St., Ft. Bragg, CA 95437; 707/964-7056.
When: In 1986, 2-wk & 4-wk; late June - July.
Cost: Out-of-state — $147/2-wk, $392/4-wk; Californians — $7.50/2-wk, $20/4-wk. (In '86)
Courses: b,i. Write for current courses. Past courses included relief carving and tools and techniques.
Comments: Teaching influenced by James Krenov philosophy — woodworking as part of life and personal expression. 6-days/wk. On the coast in redwood forest area near Mendocino.

Kirby Studios, Ltd.
Second location for Georgia-based Ian Kirby. Just south of Astoria, Oregon, in small town at mouth of Columbia River. Write Georgia address. See listing under "South/Southeast."

Oregon School of Arts and Crafts, 8245 SW. Barnes Rd., Portland, OR 97225; 503/297-5544.
When: Wkends, 1-wk; June-Aug.
Cost: $60-$75/wkends, $200/1-wk; + lab.
Courses: b,i,a. Carving, tools, techniques.
Comments: Lush suburban area; coastal mountain range visible from well-equipped shop.

Woodturning Workshops, Craft Supplies USA, 1644 S. State St., Provo, UT 84601; 801/373-0917.
When: 5-d; 7 sessions starting late April.
Cost: $295/5-d.
Courses: b,i,a. Basic spindle and faceplate turning plus more specialized turning.
Comments: Top turners (such as Dale Nish, Richard Raffan, Rude Osolnik, Mel Linquist, Ray Key). See extensive collection of lathes and turned work.

MIDWEST

Alpine School of Woodcarving, 225 Vine Ave., Park Ridge, IL 60086; 312/692-2822.
When: 1 wk; May-Oct.
Cost: $295; +$20 for tools if needed.
Course: b. Switzerland-style engraving (chip) carving.
Comments: Author and well-known carver Wayne Barton teaches 5-student class in his home near Chicago. Advanced students may return to work on special projects.

Conover Workshops, 18125 Madison Rd., Parkman, OH 44080; 216/548-3481.
When: 5-d; June 14-July 31.
Cost: $575/dorm students; $470/day students.
Courses: b,i,a. Turning (June Palmer Sharpless, Ernie Conover, Rude Osolnik); chip carving (Wayne Barton); shaker boxes (John Wilson); sack-back, continuous-arm Windsor chairs (Michael Dunbar).
Comments: Conovers add personal touch to workshop. Rural surroundings. Activities

Continued on page 88

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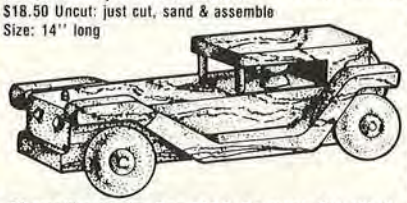

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TAKE A HOBBY VACATION

Continued from page 86

planned for evenings. Graduation ceremony/dinner. 10 tons of equipment brought in for workshops.

Festival of Crafts, University of Wisconsin-Stout, Office of Continuing Education and Summer Sessions, Menomonie, WI 54751; 800/45-STOUT (out-of-state), 800/22-STOUT (in-state).
When: 1-wk; in June.
Cost: Not set for '87; dorms $6/night, single room $9/night ('86).
Courses: b,i,a. Cabinetmaking, boat building, turning, decoy carving.
Comments: In northwest Wisconsin about 50 miles from Minneapolis. Lake Menomonie within walking distance.

Northern Illinois University, College of Continuing Education, De Kalb, IL 60115. Attn: Linda Johnson; 815/753-1783.
When: 2-d, 3-d or combine workshops back to back; write for specific schedule; in May.
Cost: $225/2-d; $300/3-d.
Courses: b,i,a. Usually includes working with specific tools (radial arm saw, router, hand tools) or materials (plastic laminates) or shop setup for beginning professional.
Comments: Dr. Roger Cliffe emphasizes practical, timely aspects of woodworking.

Norwegian Craft Workshops, Vesterheim, Norwegian-American Museum, 502 W. Water, Decorah, IA 52101; 319/382-9681.
When: 2-d, 5-d; spring through fall.
Cost: $40/2-d; $95-$115/5-d; +lab.
Courses: b,i,a. Send self-addressed, stamped business-size envelope. Often includes acanthus, figure and chip carving, stave construction, bentwood techniques.
Comments: Top instructors from U.S. and Norway, such as Harley Refsal and Johan Hopstad. Largest collection of Norwegian and Norwegian-American crafts in country. In historic buildings in scenic small community.

Pittsburg State University, Department of Industrial Arts and Technology, Pittsburg, KS 66762; Attn: Denna Loughmiller; 316/231-7000.
When: 2-d, 1-wk; spring, fall, and winter.
Cost: Make inquiry; school provides lodging.
Courses: b,i,a. Write for schedule and courses.
Comments: "Hands-on" industrial arts/wood technology school. Latest equipment in general shops and professional/industrial shops. Many courses for professional, but occasional short courses for beginners.

Villa Maria Woodcarving Workshops, Box 37051, Minneapolis, MN 55431; 612/827-6590.
When: 1-wk; Aug. 9-Aug. 15.
Cost: $275 with lodging and meals; $125 for day students.
Courses: b,i,a. Whittling, relief, figure, caricature, and bird carving; marquetry.
Comments: Most instructors from Minnesota Woodcarvers Association. Stay at Villa Maria Retreat Center in Frontenac, wooded area on Mississippi River and Lake Pepin.

SOUTH/SOUTHEAST

Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, TN 37738; 615/436-5860.
When: 1-wk, 2-wk; June - mid-Aug. Special workshops all year.
Cost: Fee, $120-$130/wk; dorm and meals, $110/wk; single room and meals, $180/wk.; +lab.; +$30 processing fee.
Courses: b,i,a. Various turning and construction courses by known craftsmen.
Comments: Seventy acres on wooded hillside next to Great Smoky Mountains National Park. Consistently draw top instructors in supportive and creative crafts environment. Activities to encourage association of various craftspersons.

Augusta Heritage Arts Workshop, David & Elkins College, Elkins, WV 26241; 304/636-1903
When: 1-wk, 2-wk; mid-July - mid-Aug.
Cost: $150/1-wk +lab.; $510/2-wk in guitar construction +$100 lab; $340/2-wk in mandolin construction +$100 lab.
Courses: b,i,a. Children 14 and younger with instructor's permission. Log cabin construction, folk carving and whittling, treenware, basketry. May take "mini-course" in second type of woodworking or another craft.
Comments: Focuses on traditional arts of American pioneers from fiddling to folk art. Special evening performances and activities. Near national forest and one hour from water resort area.

Highland Hardware Seminars, 1045 N. Highland Ave., NE, Atlanta, GA 30306; 404/872-4466.
When: 1-d, wkends; early spring and fall.
Cost: $25/d; $60-$90/wkends.
Courses: b,i,a. 1-d courses in basics of various tools and techniques; weekends twice a season bring in guest instructors, such as Michael Dunbar and Tage Frid.
Comments: Send $1 for subscription to *Wood News* (24-page publication, 2-3 a year) to know course offerings.

Kirby Studios, Ltd., 811 Atlanta Rd., Cumming, GA 30130; 404/889-9823.
When: 1-wk; June 1 - Aug. 14 (5 sessions each in Georgia, Oregon)
Cost: $375; + lab.
Courses: b,i,a. Ian Kirby teaches basic techniques; frame and panel and drawer making; furniture making techniques; learning to draw and design; furniture designing.

Comments: Biggest attraction is Kirby. New class teaches process and principles of design with students completing full-size mock-up of project.

Penland School of Crafts, Penland, NC 28765; 704/765-2359.
When: 1-wk, 2-wk, 3-wk; June 1 - Oct. 9.
Cost: $165/1-wk; $300/2-wk; $425/3-wk; +lab. Many options and prices for room and board.
Courses: b,i,a. Write for specific subjects; instructors expected to be Brad Smith, Doug Sigler, John Dodd, Lauren McDermott, Michael Pierchalla, Michael Hurwitz, Mitch Ryerson, and Randy Shull.
Comments: Though Penland offers beginner-level courses, its director emphasizes that its students should be those who plan a lifelong commitment in a particular craft. On 400 acres in Blue Ridge Mountains.

Berea College, Industrial Arts Dept., Berea, KY 40404; Dr. James Hall; 606/986-9341.
When: Wkend; mid-June
Cost: $170 ('86); housing costs vary, dorm or campus hotel
Courses: b,i,a. Woodturning symposium; instructor rotates to small groups of 6-8.
Comments: Borders Appalachians, bluegrass country. Major crafts environment dating to 1855. Students involved in crafts industries.

NORTHEAST/EAST

Brookfield Craft Center, Inc., Box 122, Brookfield, CT 06804; 203/775-4526
When: wkends; 3-d, 5-d; all year. (Classes of other lengths may be offered.)
Cost: $105/wkends; $150/3-d; $240/5-d; +lab.
Courses: b,i,a. Write for specifics. Past classes included spindle table, turning and fluting bowls, strip plank boat building.
Comments: Two campuses — Brookfield and South Norwalk. Draws nationally known instructors. Will help arrange bed-and-breakfast boarding.

Haystack Mountain School of Crafts, Box 87, Deer Isle, ME 04627; 207/348-2306.
When: 2-wk, 3-wk; early June - early Sept.
Cost: $325/2-wk; $425/3-wk; +lab. Many options and prices for room and board.
Courses: b,i,a. Write for specifics. Past courses included wood sculpting, plain and tapered lamination for furniture, hand and machine woodworking techniques.
Comments: "Letter of intent" requested with application. Looking for those with sincere, continuing interest in crafts, not necessarily as full-time occupation. Creative environment with many special demonstrations and shows. Overlooking East Penobscot Bay.

Japanese Masters Seminar, Masterpiece Tools, Suncook, NH 03275; 603/736-8227
When: 3-d, 5-d, 10-d; August.
Cost: $350/3-d; $550/5-d; $750/10-d. Includes lunch. Will furnish tools if need.
Courses: b,i,a. Hand-making shoji screens, tool sharpening, making hand plane, temple construction and joinery.
Comments: Relaxed atmosphere, sitting in pine forest of Bear Brook State Park. Free to participate at any level — watching to hands-on work with Japanese master. Instruction translated; woodworking lexicon supplied. May camp at no charge. Near Concord.

Peters Valley Crafts Center, Peters Valley, Layton, NJ 07851; 201/948-5200.
When: Various lengths up to 14/d; June - Aug.
Cost: $65/2-d; $85/3-d; $135/wk; +lab; +$10 reg. fee; food, $15/d; lodging, $15/night ('86 prices).
Courses: b,i,a. Past courses range from making shoji screens to selecting and drying green wood. Write for 1987 courses.
Comments: Top guest instructors and lesser-known but excellent woodworkers teach in farm setting in Delaware River valley.

Rhode Island School of Design, Continuing Education, 2 College St., Providence, RI 02903; 401/331-3511, ext. #416.
When: 6-wk; late June - July.
Cost: Adults, $550; high school students, $1,000. Room and board, $800.
Courses: b,i,a. Adults — basic woodworking and design, from tools to joinery to turning to lamination bending. High school juniors and seniors — changing nature of wood, design and drawing, woodworking.
Comments: Extremely well-equipped shop in top design school. High school course stresses learning to work through design process on project of own choosing; special field trips, weekend activities.

Rochester Institute of Technology — Summer Sessions, Box 9887, 1 Lomb Memorial Dr., Rochester, NY 14623-0887; 716/475-2229.
When: 2½ wk, start mid-July.
Cost: Undergraduates, $420/session; graduates, $633/session ('86). Inquire about campus housing.
Courses: b,i,a. Woodworking and furniture design. For serious craftsmen seeking expertise and aesthetic judgement in projects.
Comments: Other, often concurrent, courses in metals, graphics, and textiles. University atmosphere — art and natural history museums, concerts, recreation facilities.

Russ Zimmerman Woodturning School, RFD 3, Box 242, Westminster West Road, Putney, VT 05346; 802/387-4337.

Continued on page 91

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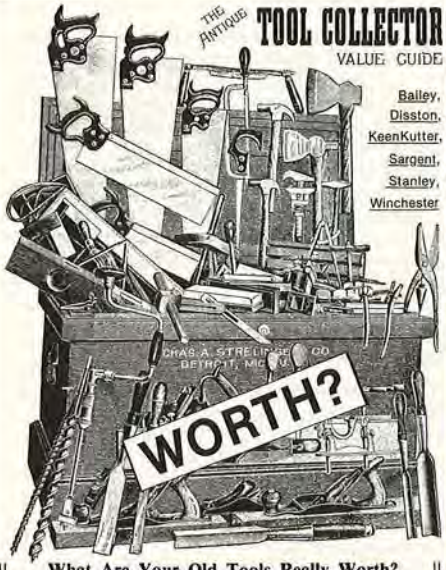

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TAKE A HOBBY VACATION

Continued from page 89

When: 2-d; every Wed/Thurs. and wkends.
Cost: $240 with room and board; $210 with 3 meals.
Courses: b,i,a. Tool sharpening, spindle and bowl turning; geared to student level and interest.
Comments: Only 2 students at a time. Stay in Zimmerman home. May begin or hone your skills in nonjudgmental, individualized environment. Will receive Zimmerman "Woodturning Letter" for help at home.

MULTIPLE LOCATIONS

Shopsmith Inc., 6640 Poe Ave., Dayton, OH 45414; toll free, 800/543-7586 to locate store nearest you.
When: 1-d, 3-d; 2-3 courses each month.
Cost: $55-$75/1-d; $250-$275/3-d.
Courses: Fundamentals of woodworking (b), basic techniques and use of Shopsmith's Mark V; Cabinetmaking (i,a) takes you from rough lumber to completed cabinet. Various 1-d determined by local store.
Comments: Contact local store (14 nationally and one in Toronto) about courses. Designed for new or prospective owners of Mark V. Local instructors available in stores for questions, problem solving.

32MM Schools, Woodworking Technology & Training, 10052 Gravier, Anaheim, CA 92804; 714/956-8980.
When: 2-d. Write for schedules and locations.
Cost: $400. Some special rates.
Course: a. From "what is 32mm system?" to selecting machinery to using metric system even in customized applications. Discusses use from materials through laying out, banding, boring, hardware, and assembly.
Comments: Jon Elvrum shows how to combine traditional quality and 20th-century technology and substrate materials. Primarily for those who have an interest in or have converted shops to 32mm system or teach about it. Sends you home with texts.

OUTSIDE UNITED STATES

Canadian School of Woodturning, 1069 Southdown Rd., Mississauga, ON L5J2Y7, Canada; 416/823-5937.
When: 3-d minimum; Mon.-Thurs. year-round.
Cost: $105/d with lunch; $10/room and board. Camp free.
Courses: b,i,a. One-on-one instruction by Bert Thompson at your level. Basic course teaches grinding and honing tools, turning by shearing, turning without need for templates for like pieces or sandpaper to smooth surfaces.
Comments: Stresses shearing with no scraping of wood. Thompson will travel to turners. Located 20 miles from Toronto.

John Sainsbury's Studio for Woodcraft, I, Lichfield Drive, Brixham TQ58DL, South Devon, U.K.; (08045) 6204.
When: 2-d to 14-d; year-round.
Cost: £40./d, lunch and tea; +lab.
Courses: b,i,a. Woodturning; carving; woodcrafts (hand, power, and machine tools; materials, construction techniques, setting up shop); creative woodcraft (creating crafts without much space and with hand or simple power tools).
Comments: Leading woodworker/author. Not more than 2 students. Particularly well-equipped shop with latest tools, wood "reference library."

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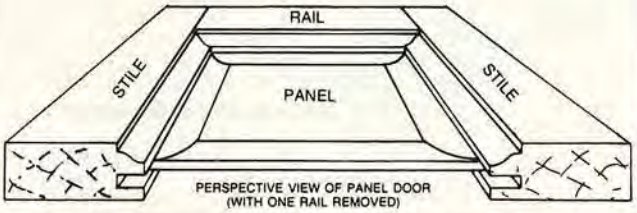

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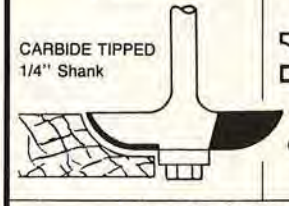

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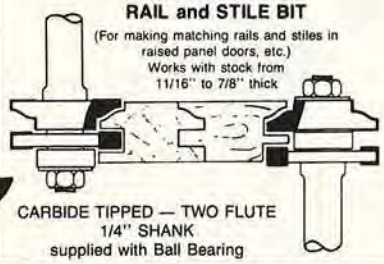

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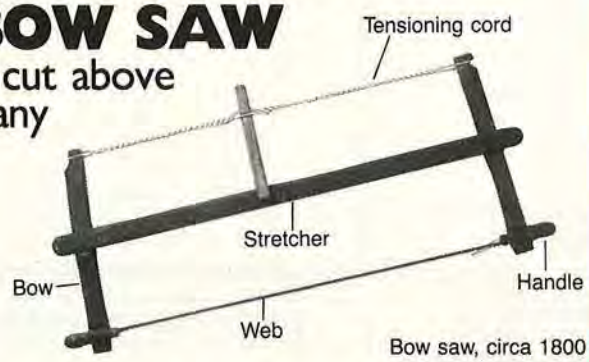

Bow saw, circa 1800

For hundreds of years before the first band saw ever found its way into a shop, craftsmen were making scalloped and scrolled edges on wood by hand with a thin blade stretched taut between two handles by a tensioning cord. Depending on the tradesman using it — the cabinetmaker, the cooper, or the wheelwright — the tool was likely to be called a cabinet saw, turning saw, felloe saw, or bow saw. The blade's unique mounting enables it to saw circles, half-circles, S-curves, and notches equally well in thick wood or thin.

Fancy work with a turning blade

Bow saws use a thin, narrow blade about ⅜" wide, called the *web*, that's not anchored in the wood uprights, or *bows*. The blade only passes through the bows to be held in place by the *handles*. This manner of attachment permits the blade to turn from side to side and even rotate as it cuts through the wood (as compared to the band saw blade, which remains in position as the wood turns around it).

For a variety of needs, bow saws were made in many sizes — from tiny ones with 6" blades to ones with blades as long as 48". The bows often were made of exotic wood, and gracefully curved. Plain saws feature beech, apple, or cherry.

To hold the *tensioning cord*, the tips of the bows must always be hooked or notched. In some fine examples, the tips were eloquently carved. The handles were turned, often elaborately.

Age, condition, and quality dictate value

You may not be able to accurately date an old bow saw because the style hasn't changed over the years. Bow saws made in the 1800s and after sometimes carry the maker's mark on one of the bows near the blade, or on the *stretcher* — the key to your search for its origin. This mark also adds value, especially if you find a bow saw in generally sound condition. Worth even more are those with fancy carved bows of exotic wood. Expect to pay from $30 to $100 or more for an old one; about $35 for a new one.

Written with Vernon U. Ward, tool collector and dealer, editor and publisher of *The Fine Tool Journal*.
Photograph: Bob Calmer

Print this article

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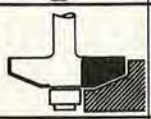	#15	RAISED PANEL	20° Angle	1-5/8"	1/2"	25.00
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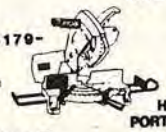
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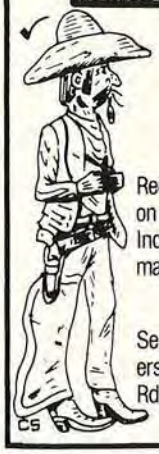

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#3, Jan./Feb. '85: Split Oak Baskets, Drawer Pulls, Wooden Safe, Basic Cabinet Construction, Stereo Cabinet, Desk, Dado Sets, Clear Finishes, Cheval Mirror, End Vise, Drill-press Stand.

#4, April '85: Cherry Profile, Hall Table, Homemade Router Table, Modular Workbench, Flexible Veneers, Tissue Box Cover, Waterfall Table, Shaker-style Cupboard, Table Saws.

#5, June '85: Mahogany, Laminated Ring Vessels, Jigsaws, Heirloom Level, Raised Panels, Oak Library Table, Kid's Picnic Table, Lawn Furniture, Outdoor Finishes, WOOD Binder.

#6, August '85: Workbench, Turning Between Centers, Bud Vase, Pedestal Stand, Clone Boxes, Patio Table, Hardwood Plywood, Kids' Boats, Table Saw Helpers, Barstools, Lathes.

#7, Oct. '85: Bill Hopkin's Clocks, Birch, Carving Tools, Resawing Jig, Surface Sander, Magazine Rack, Hall Shelf, Classic Radio, Found Wood, Doll Furniture, Coffee Table, Palm-grip Sanders.

#8, December '85: Pecan, Psalteries, Mallets, Bending Wood, Coat-tree, Bentwood Sled, Router Bits, Scroll Saw, Epoxy Glue, Snack Tray, Jeep, Desk Set, Charm Bears, Necklace, Wall Hanging.

#9, February '86: Turning Secrets, 8-speed Multi-machine, PEG, Japanese Handtools, Standards for Seating and Tables, Dining Table, Jewelry Box, Furniture Stripping, Clocks, Index.

#10, April '86: Ash Profiled, Plastic Laminates, Parsons Table, Dining Chair, Sharpening with Waterstones, Small Shop, Redwood Lantern, Ceiling Fixture, Wren House, Toy Airplane, Young Carver.

#11, June '86: Ponderosa Pine, Boomerangs, Patio Party Wagon, Cordless Drills, Dominoes and Case, Screws, Sizing Hardwood, Miter Box, Kid's Playhouse, Sharpening, Weed Pots.

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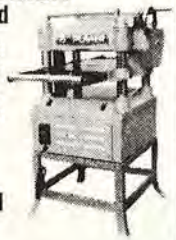

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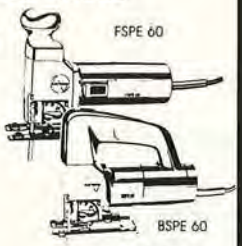

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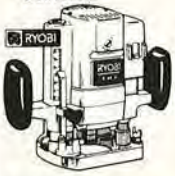

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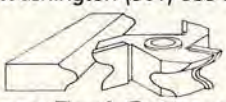

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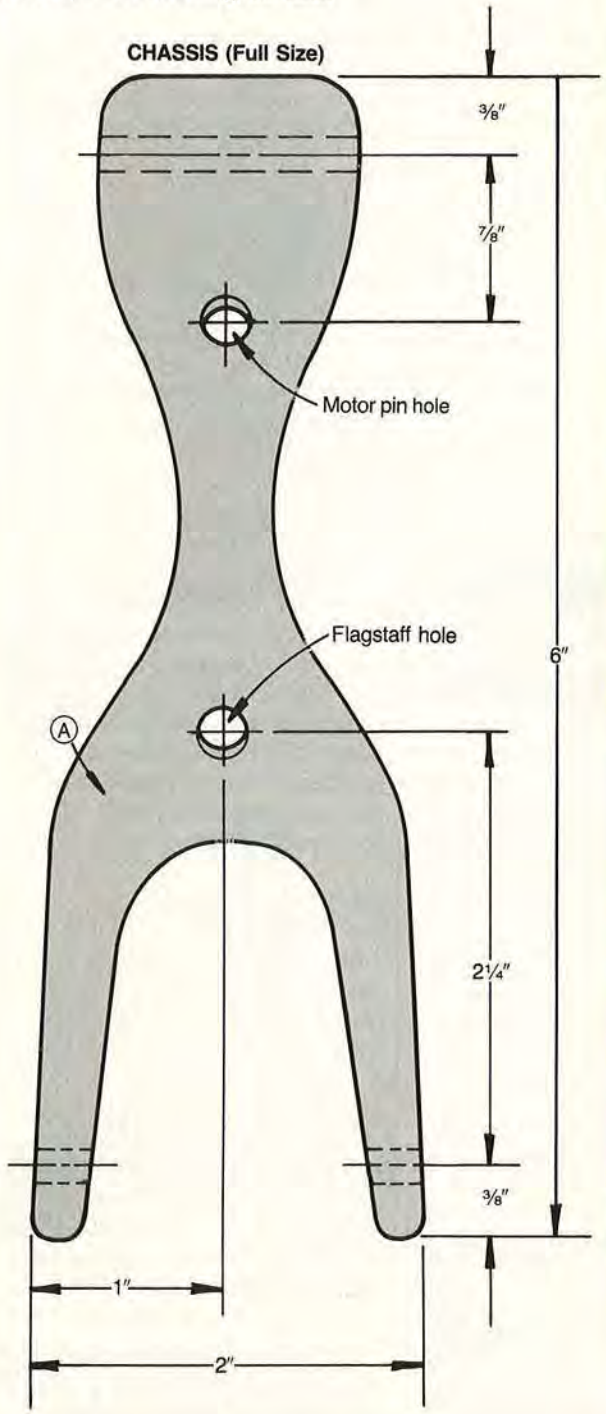
RUBBER BAND DRAGSTER

Continued from page 84

around the flagstaff, and cut it to shape. Attach the rubber bands for the "tires" and the "motor". To "fuel" the dragster, wind the rear wheels, holding the wheels between strokes to prevent them from spinning. Still holding the wheel, set the car on a smooth surface, and "let 'er rip".

Project Design: Michael Spikes
Photograph: Bob Calmer
Illustrations: Kim Downing; Bill Zaun



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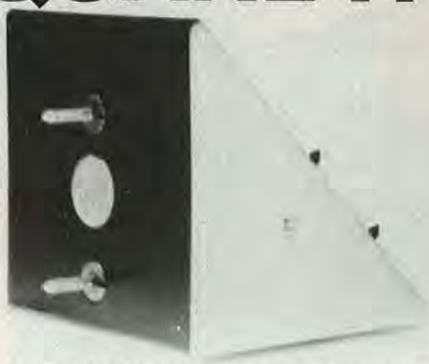

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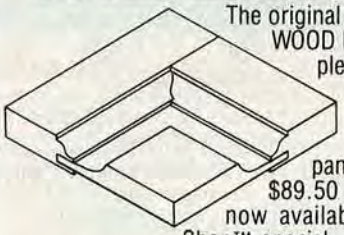

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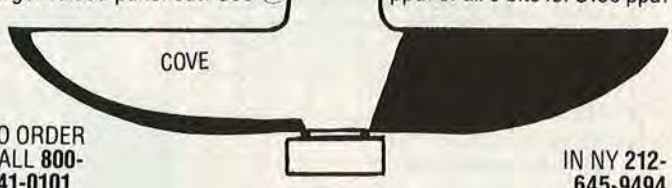

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TRAIN-TUNNEL BOOKENDS

Continued from page 83

bottom of the body assembly, and the cupola (O) to the top. Using the dimensions on the Caboose Drawing, locate and drill the axles in the chassis.

7 Epoxy the ¾" wheels (S) to the ⅛" brass axles cut earlier. Then, epoxy the axle assemblies to the caboose chassis. Finally, glue the chimney in place.

8 Again, using the belt sander and stand, sand the wheels flush with the front edge of the caboose.

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Photographs: Bob Calmer
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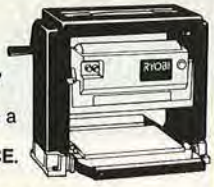

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6 Inch (any grit)	.55 Ea.
8 Inch (any grit)	1.00 Ea.
9 Inch (any grit)	1.40 Ea.
12 Inch (any grit)	2.00 Ea.

Silicon Carbide-Nonloading DA Sanding Discs

5 Inch	100 thru 320 grit	$ 7.00 per 100
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	80 grit	13.50 per 100

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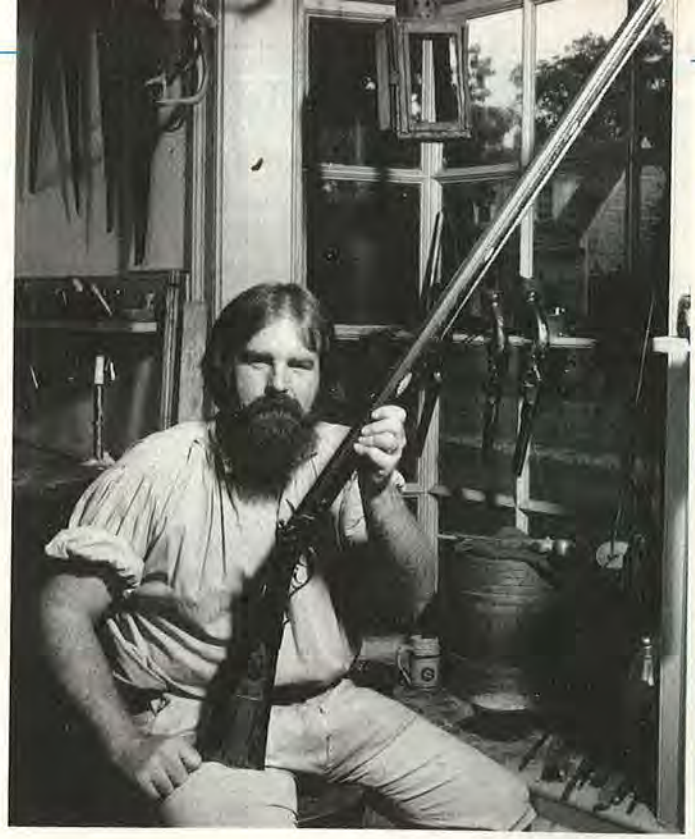
THE GUNSMITH

"Stolen from the subscriber on his march from Augusta to Williamsburg . . . a very neat rifle gun. The stock of sugar-tree, curled — made pretty dark by aqua fortis."

— John Grattan advertisement in the *Virginia Gazette,* April 12, 1776

Print this article



George Suiter still practices the traditional gunsmith's trade at Colonial Williamsburg in Virginia.

We have no information as to whether Mr. Grattan ever caught up with the thief who stole his rifle, but it's easy to imagine the result of such an encounter. His gun, you see, was no run-of-the-mill, government-issued military musket. It was a handcrafted, flintlock long rifle — an American original, a work of supreme craftsmanship and artistry. Only the Lord could help the man caught stealing one!

Just as Mr. Grattan's long rifle was no ordinary gun, it was made by no ordinary craftsman. Combining the skills of the blacksmith, machinist, engraver, sculptor, and woodcarver, the gunsmith brought the wood, iron, and brass together in a creation of precision and beauty.

By Roy Underhill

Master housewright at Colonial Williamsburg and host of the popular PBS series The Woodwright's Shop, *Underhill is also an author and lecturer.*

A STOUT STOCK FROM THE SUGAR TREE

Although he may have spent several weeks forging and machining the barrel and flintlock mechanisms, the gunsmith's work on the stock began years earlier. The fit (and function) of the iron and brass parts of the rifle would have been ruined if the wooden stock was not perfectly seasoned. So, the gunsmith set aside his wood for three to seven years.

Some in the trade might have stocked a rifle with cherry, walnut, or plain maple. But for a classic American weapon, the choice was that tough stuff from the sugar tree, curly maple. Its cross-grain figure proved not only shock-resistant, but highly decorative.

Even in the pile of roughly shaped stock blanks, the gunsmith had to plan in order to use his curly maple to its best advantage. The gunsmith preferred to display the pretty wood in the broad butt of the rifle. In the wrist of the stock, however, where the breech of the barrel, the firing mechanism, and the grip for the right hand converge, he allowed less figure so that crucial point might never weaken.

THE CRUCIAL FIT OF LOCK, STOCK, AND BARREL

The gunsmith's first task in assembling the rifle was to bed the tapered octagonal barrel into the roughly shaped stock. After roughing the barrel in place with gouges and wood chisels, he made the final approach to a perfect fit by trial and error.

Coating the barrel with soot from a burning candle, he tried it in place, then removed wood only where the transferred soot marks indicated interference. Painstaking, yet positive, this same method was used to fit all the remaining metal parts. But it was worth it. Unlike crafting a tea service or writing desk, lesser workmanship in a rifle would have been unacceptable, and possibly even fatal, to the owner.

With the barrel as the baseline, the gunsmith then fitted the lock and trigger mechanisms, not just into the wood, but into a precise working relationship with one another. Scratching the outline of the lockplate onto the wood,

Continued on page 102

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OLD HAND WAYS

Continued from page 101

he began the hollowing, and faced another challenge: Hollowing the stock to house these workings weakened it at exactly the point where strength was most needed. Leaving every bit of wood that he could, the gunsmith slipped the lock into the stock like a hand into a glove.

Next, and with equal precision, the gunsmith cut through the stock for the trigger and inlaid the many brass mountings. Brass plates, unlike the finished iron of the lock, could be filed flush along with the wood around them, so that the two surfaces blended together. Removing any mounting required an accountant's mind: Each wood screw had to go back into the hole from which it was removed because even the screws were custom-made, the threads being individually hand-filed.

DECORATED FOR GRACE AND UNITY

A rifle's decoration unified its parts, and carving was no easy work. Rather than incising the patterns into the wooden stock, the gunsmith made interlacing scrolls by the much more difficult method of cutting away the background and leaving the patterns as raised islands. He pared away the wood to a constant depth, paying special attention to the potentially stout and bulky wrist where his carving made it look slender.

Finishing was the crowning touch. To darken the stock, the gunsmith relied on *aqua fortis,* a stain made of nitric acid mixed with iron filings. Painting it on the blonde wood had no apparent effect. However, when the gunsmith heated the surface by holding a red hot iron bar over it, the wood blossomed to a deep reddish brown.

A rubbing with linseed oil gave the color depth and the wood protection. The long rifle gleamed and radiated the life that made it one of our forefathers' most treasured possessions.

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TALKING

Our woodworking pro, Jim Boelling, shares tips, advice, and 20 years of shop know-how.

TIPS FOR LEFTIES IN A RIGHT-HANDED SHOP

Print this article

Well over 50,000 left-handers will buy this issue of *WOOD*. And for those readers, woodworking presents special challenges. Here are some tips and insights for lefties.

Tools made for right-handers

If you're not a southpaw, imagine dealing with frustrations like this: Screws can be driven only one way — clockwise. Try holding a screwdriver in your left hand. Then, turn it clockwise, as if you were driving a screw. You'll find that you can rotate your left hand only about 180°. With your right hand, you have nearly double the turning radius. No wonder lefties get tired when driving screws — it takes them twice as long! The solution can be a power screwdriver, but even then the on-off switch may be on the wrong side of the handle.

Many portable electric tools have switches in the wrong place: against a left-hander's palm during use. To shut it off, lefties have to release their grip on the tool. Some manufacturers solve this problem with ambidextrous switches.

Adapting to stationary power equipment

To rip a board on a table saw, left-handers have two choices. You can be safe and move the fence to the other side of the table (if the saw's rip-fence guide rails permit this flexibility), or you can adjust to an uncomfortable right-handed feed position. Don't push with the left hand, lining up with the board in a potentially dangerous stance behind the blade (see *above right*).

Jointers, though, have fences on only one side — for right-handed use. Lathes present some difficulty, too. But lefties develop their own techniques. In faceplate work, that means getting on the other side.

How to maintain your sanity in a right-handed world

Left-handers always run the risk of an accident. They may be caused by imbalance, improper sight alignment, and frequently, by cross-handed feeding, particularly if they're beginning woodworkers.

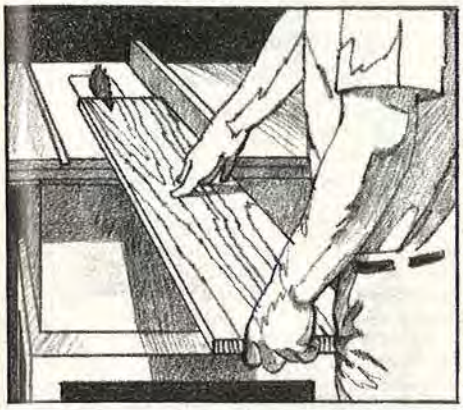
If you're left-handed here's some advice from my shop:

- Observe and learn the proper use and stance required of all power equipment in the shop not convertible for left-handers.
- If stationary power tools are convertible, change them over.
- Shop for and buy only those tools with switches and operation designed for either hand, especially circular saws, table saws, electric drills, jigsaws, and sanders.
- Never follow your instincts that favor left-handedness if they place you in an unsafe situation.

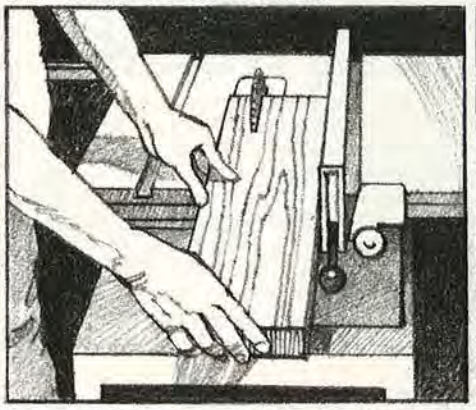
(Blade guards removed for clarity)

Illustrations: Jim Stevenson

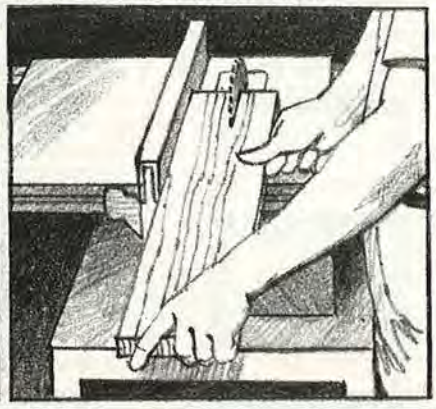
UNSAFE STANCE



SAFE RIGHT-HANDED RIPPING



SAFE LEFT-HANDED RIPPING



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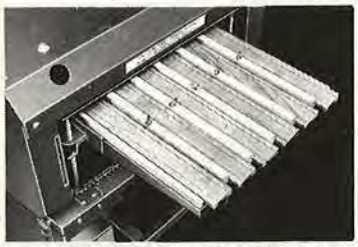

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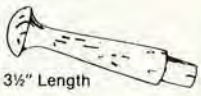

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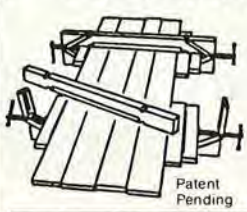

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MISFIT ON THE DRUM SANDING TABLE

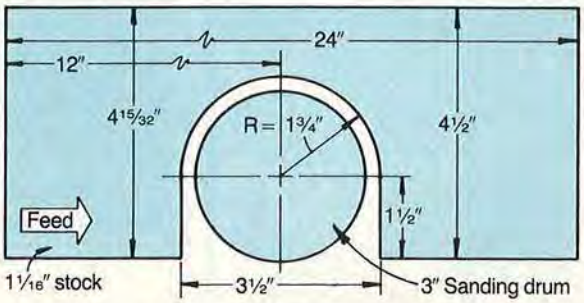
Q. *Apparently there's a mistake on the dimension for the cutout in the fence of the sanding drum table (issue #13, page 52). The radius of the cutout as given, will not clear a 3" sanding drum.*

— Robert P. Shea, Santa Maria, Calif.

A. You're right, Robert, the dimensions don't jibe. We apologize for any inconvenience.

To use the fence as it was originally dimensioned in the article, you'll need to use a 2½" sanding drum, not a 3" drum as we stated on the drawing and in the Buying Guide. If you already have a 3" drum, use the dimensions on the drawing below, to make a slightly deeper fence to accommodate the larger sanding drum.

Also, please note that if you use a 2½" sanding drum, you'll need to cut a 3" hole in the center of the table insert. If you use the 3" drum, cut a 3½" hole in the insert. This hole in the insert should be ½" larger in diameter than the sanding drum, allowing for plenty of clearance as well as room for the sawdust to be vacuumed away.



REVISED DRUM-SANDING TABLE FENCE

Continued on page 109

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ASK WOOD

Continued from page 107

IN SEARCH OF THE PERFECT FINISH

Q. *I'm trying to refinish the top of an oak dining table. After four or five coats of varnish, the pores in the wood still show. Is a glassy-smooth finish too much to expect?*

— John H. Downing, Corona, Calif.

A. No — but get ready to expend lots of elbow grease. Start by stripping the top, sanding it thoroughly, and filling any surface defects. Then apply a sanding sealer to fill the pores in the oak. Sand after the sealer dries. Now you're ready to go after that "smooth-as-glass" finish you want.

As you build up the finish, sand between coats with 220- to 320-grit paper. After each coat, check the surface for defects by shining a light at an angle across the surface. Keep adding topcoats until you're satisfied with the finish. As a final touch, hand rub with a little automotive rubbing compound on porous felt or a soft towel.

Speaking of glassy-smooth finishes, you might want to learn about how to apply one using the increasingly popular polymerized tung oil. It dries slow and produces a deep luster. For more information, see the December, 1986 issue, pages 52-53.

NAILS DON'T HAVE TO WASTE A TREE

Q. *Recently I cut a 3'-diameter black walnut from my yard. A local mill won't finish cutting it because of several nails, but the tree seems too valuable to waste. Any suggestions?*

— Sam Perry, Franklinton, N.C.

A. Don't blame the sawmill too much, Sam. A nail hit on the saw carriage might cost them a few hundred bucks resharpening the blade.

Before you cut up that walnut for firewood, here are our suggestions: First, borrow a metal detector to locate the nails. Many a mill finds a metal detector useful for just this. However, detectors may not find metal that's deeper than 7-8". If you can locate the nails, tell the mill where they are — they might attempt it.

Your second choice is to buck off the lower 8' where the nails should be and saw only the rest of the trunk. You'll lose the best part of the tree, but it won't all be lost.

Third, check around for someone with a chain saw mill to do the rough-sawing. The cost of a chain saw chain is much lower than a mill's circular saw blade if hidden nails in the log damage blade.

Illustration: Bill Zaun

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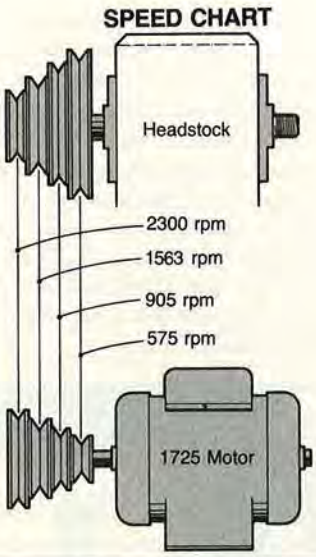
Continued from page 69

USING THE LATHE

Add sand to the bottom of each pedestal to minimize vibration. To move the tailstock and tool rest, loosen by turning their handwheels counterclockwise. Move them to the desired position and turn the handwheels clockwise to lock.

The chart at *right* shows the speeds available using the four-step pulleys. Try the slowest speed until you're used to the lathe.

For more information, refer to our faceplate turning article in the December '86 issue of *WOOD,* or our "Turning Between Centers" article in the August '85 issue of *WOOD*.



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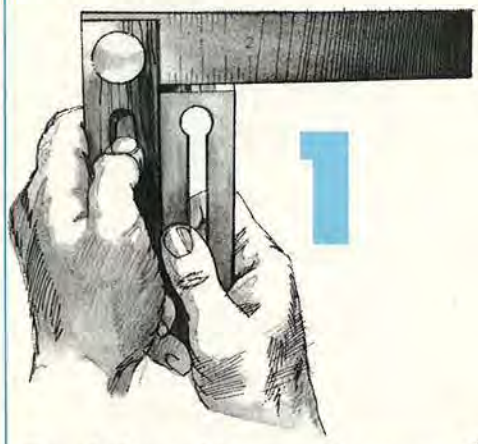
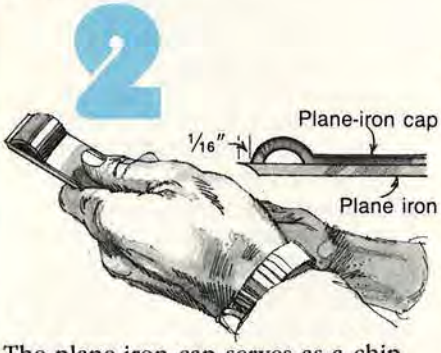
Illustrations: Kim Downing

FINE-TUNING YOUR BENCH PLANE

Bench planes have yielded high-quality results for generations of woodworkers, and they still play an important role in the workshop. There's nothing quite like the feel of shaving off a fine ribbon of wood with a properly adjusted bench plane! Here's what you need to do in order to get the results you want (refer to the labeled drawing to identify parts).



First, before making any adjustments, be sure you have a keen, square edge on the plane iron. Regrind and hone the iron if necessary before proceeding.



The plane-iron cap serves as a chip breaker, clearing away material cut by the plane iron. With the bevel of the iron down, slide the cap forward to within about 1/16" of the front of the iron. Soft-grained woods require slightly more reveal. If the entire surface of the cap doesn't seat against the iron, check the cap for square.

Fit the cap and iron in place on top of the frog. Now, insert the lever cap and lock it in place. (The lever-cap screw may need adjustment if the cap doesn't snap down smoothly and snugly with reasonable effort.)

Sight down the sole of the plane from the front, and move the lateral adjustment lever until the iron protrudes evenly below the sole. Viewing the blade from the front creates a dark shadow across the blade, making it much easier for you to make the adjustment accurately.

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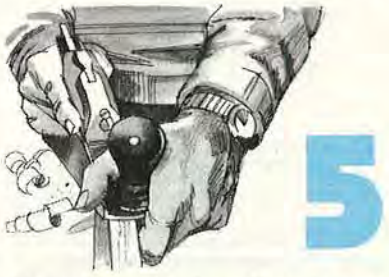
The adjusting nut behind the frog regulates the depth of the cut. Again sighting down the sole of the plane from the front, rotate the knob until the iron just barely breaks the plane of the sole. The object is to cut a thin, even ribbon of wood with each pass of the plane without any gouging.



The real fun begins when you work the plane *with the grain*. With the piece held tightly in a vise and the plane at the angle shown here to avoid fatigue, make your first pass. Listen for a nice "swish." It's an intoxicating sound! If you meet much resistance while planing, retract the blade slightly. And if the shaving is uneven from side to side, adjust the lateral adjustment lever.

Illustrations: Jim Stevenson

Information

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BUY YOUR SANDING BELTS DIRECT FROM THE MANUFACTURER — Industrial Abrasives is the company that gives you six free belts with every dozen ordered. But, sanding belts are not the only product we have to offer. In our catalog you will find many specialty items not readily available in your hardware store. Price of catalog refunded with first order. INDUSTRIAL ABRASIVES CO. $1.00. *Circle No. 1975.*

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The Bulletin Board

WOODWORKING FACTS, FACES, AND FABLES

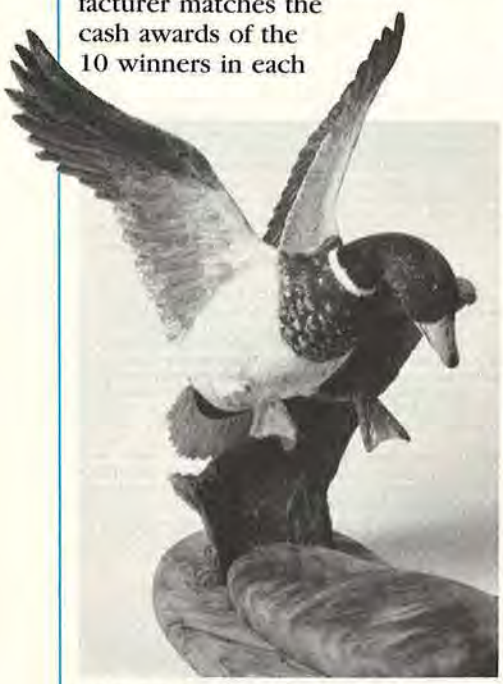
STUDENTS *AND* SCHOOLS EARN PRIZES IN COMPANY CONTEST

Jamie Brisky, a senior at Burlington-Edison High School in Burlington, Washington carved out a $500 grand prize in Dremel's Sixth Annual Creative Project Scholarship Contest. His project, the mallard drake carving, *below,* took top honors in the 11th and 12th grade division.

In Dremel's annual contest, the school wins, too. The manufacturer matches the cash awards of the 10 winners in each division with Dremel equipment of equal value as a gift to the winners' schools.

Open to students in grades 9-10 and grades 11-12, the contest limits projects created in a shop, art, or applied science course to a maximum $100 materials cost. An instructor from such a course must certify all individual entries as original and constructed by the student. The project must be made, at least in part, with Dremel tools.

While the deadline for entering this year's contest may be too fast approaching (March 11), you or someone you know can get a leg up on next year's by sending now for details. Write: *School Shop Contest, Dremel, 4915 21st St., Racine, WI 53406.* Or, call *414/554-1390.*



Mallard Drake **wins $500 top prize for high school student.**

RIDING ON WOOD

One mile of mainline railroad track requires about 3,000 wood crossties for rail support. Sawn from oak, elm, maple, and other hardwoods, each 7″x9″x8′6″ crosstie represents about 41 board feet of wood, or 123,000 board feet per mile! Depending on climate, the preservative-treated ties usually last 25 years or longer before they have to be replaced.

SHRINKING FORESTS

In 1950 forests of all kinds covered one quarter of the earth's surface. Today, say world resource experts at the U.N., forests have shrunk to one fifth.

Much of the loss occurs in the tropical rain forests of underdeveloped nations, where forests topple to make way for agriculture. In contrast to the forest management and replanting practices of developed nations which control annual harvest, the clearing of rain forests often knows no bounds. Resource watchers estimate such clearing results in the loss of 25-50 acres of tropical trees every minute!

FLEAS FLEE FROM WALNUT

Summer will soon be here. And with it, those persistent pests that persecute both animal and man — fleas. If they're a bother where you live, try whacking them with walnut.

It seems that American black walnut trees produce a chemical called juglone, that permeates the wood as well as the leaves. While this chemical poses no threat to man, fleas hate it!

James Montgomery, Executive Vice President of the Southern Forest Institute, found out just how much. Returning from an extended vacation one summer, he and his family discovered that neighborhood cats had made themselves at home in their basement and the fleas the cats brought with them had taken over the house.

Getting the cats out wasn't a problem, but the fleas were. That is, until the family doctor gave the Montgomerys a tip: Spread small sprigs of fresh walnut leaves strategically around the house. They did, and within a few days the fleas followed the cats out. Their doctor learned long ago that walnut leaves strewn about in his bird dog kennels kept them flealess.

This ability to put vermin to flight makes walnut a *vermifuge* as well as a fine cabinet wood.

Illustration: Jim Stevenson

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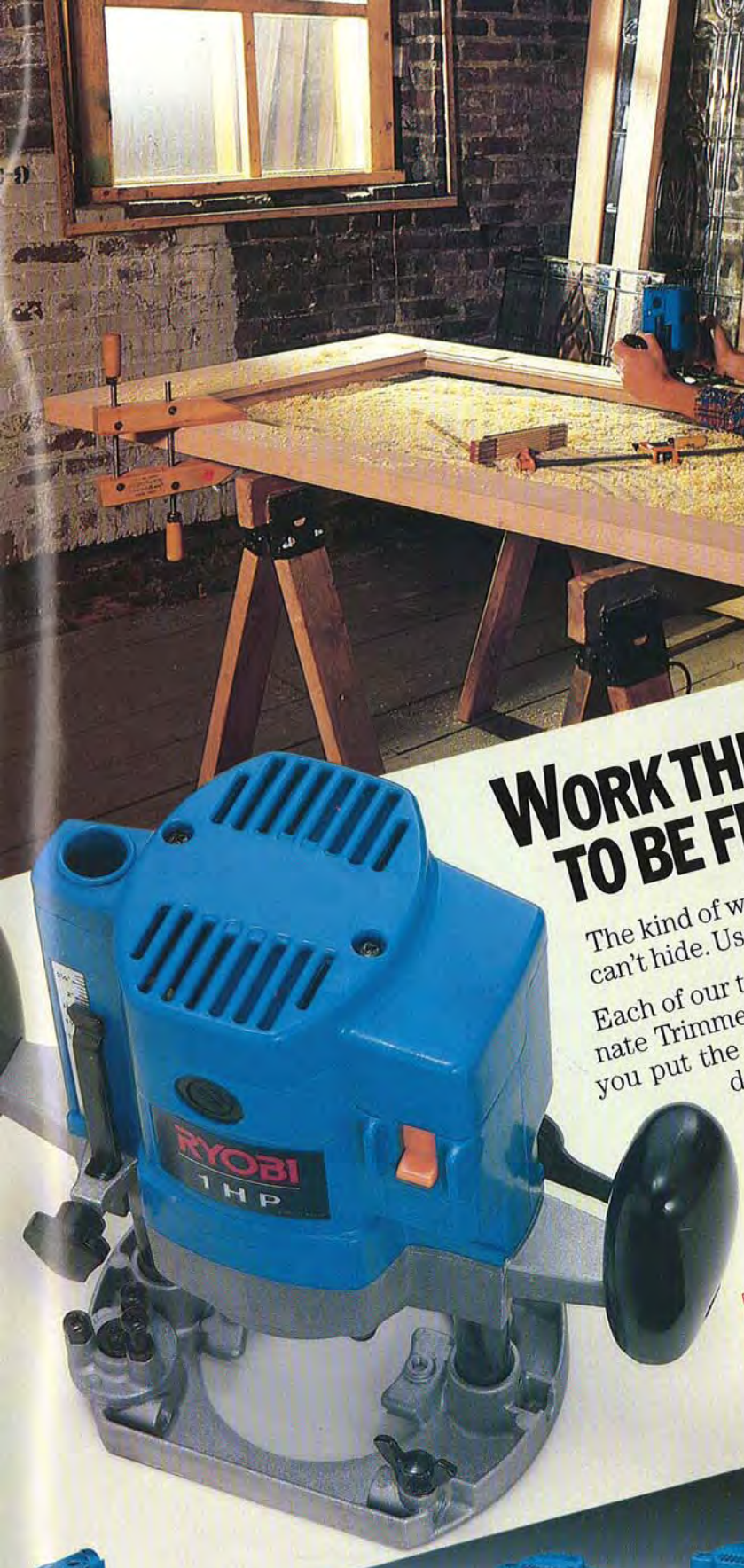

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